EDP industry report and market review

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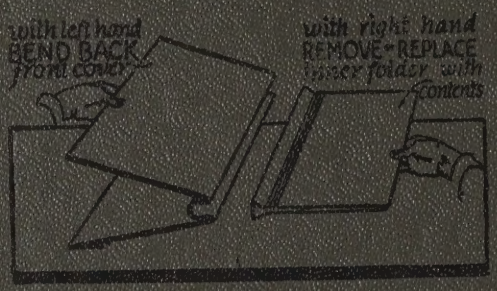

E|D|P
INDUSTRY AND MARKET REPORT
A SEMI-MONTHLY NEWSLETTER FOR EXECUTIVES IN THE ELECTRONIC DATA PROCESSING INDUSTRY, AND THE FINANCIAL COMMUNITY.

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CENTRALIZATION OF GOVERNMENT COMPUTER BUYING UNDER BROOKS BILL SUGGESTS SHARPLY INCREASED COMPATIBILITY/COMPETITION IN EDP INDUSTRY

"We feel that certain features basic to the Brooks Bill will tend to favor smaller manufacturers. For example, consolidation of procurement might cast a better-focused light on the IBM monopoly — hopefully such an eventuality would tend to cause the government to take steps to distribute the EDP business. However, the bill will probably tend to favor IBM in the case of their existing installations."

So states Control Data V.P. James G. Miles about Public Law 89-306, the enactment of the so-called Brooks Bill. This law provides the mechanism through which a major change can be made in the way that the Federal government, the source of over 10% of the computer industry's business, selects and procures computer systems. Its potential impact on the EDP industry is so substantial that we feel the following assessment of the probable consequences of its implementation is well justified.

Provisions of the bill and who will implement it

Last October 22 (the final day in 1965 that pending legislation could be passed) an extraordinary effort was employed to push the Brooks Bill through Congress. This unorthadox procedure was the hectic climax to several years of government investigation into the expense of acquiring and maintaining their computer installations -- a cost that runs over $3 billion annually, or 3% of the federal budget.

Signed into law on October 30, 1965, by President Johnson, the Brooks Bill is designed to establish the authority and provide the operating machinery for improving the efficiency of procurement, utilization, and management of government-operated automatic data processing equipment (ADPE). The key feature of the bill is the authorization of the General Services Administration (GSA) to:

- Supervise the procurement of all government-operated ADPE;
- Transfer ADPE between government agencies;
- Provide for joint utilization of ADPE by two or more government agencies; and

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- Establish and operate ADPE pools and data processing centers for the shared use of ADPE by many government agencies.

GSA may delegate some of its powers under the Brooks Bill to one or more Federal agencies when national defense, security, or other special circumstances require it.

To organize and promote the government-wide coordinated effort necessary to achieve the goals of the bill, the Bureau of the Budget (BOB), the GSA, and the National Bureau of Standards (NBS) have been given special authority and control.

Under this legislation BOB is given the job of fiscal control and policy definition. GSA is delegated the largest and most critical operational responsibility -- that of coordinating and administering the program. NBS is to offer technical support and work toward developing standards for improving data processing compatibility between government ADPE.

Within the last month, Joseph F. Cunningham has been appointed head of BOB's newly organized ADPE management branch. One of his first tasks will be to draft ground rules for implementing the bill. Once this document is prepared, Edmund Dwyer, Director of Data Processing Coordinating staff for GSA, and Norman Ream, Director of the Center for Computer Services and Technology for NBS, will cooperate in carrying out the provisions of the bill.

Explicit guidelines for implementing the bill have not yet been drawn up, but its provisions indicate:

- More federal money will be available to buy computers. The Brooks Bill authorizes the establishment of a revolving fund for the purchase, lease, maintenance, and repair of ADPE. In the past, agencies were often compelled to lease or rent ADPE because budget funds were not available, even though long run savings would result by an outright purchase. The centrally-controlled revolving fund, however, permits agencies to make immediate purchases if such action is economically justified. As a result, there should be an increased percentage of computer sales to the government. Also, some agencies, when existing budgets are inadequate, will use the fund to finance procurement of professional services, such as ADP systems design and programming.

  Although the revolving fund potentially will make more money available for ADPE, it would impose another step in the procurement procedure, resulting in a slower ordering cycle. Such delay could jeopardize an agency ADP program or reduce the value of the equipment being acquired.

- Greater government effort to buy ADPE at volume discounts. The Brooks Bill strengthens the government's bargaining position in acquiring ADPE at special discounts as a volume purchaser. Since the GSA under the Brooks Bill will be buying ADPE for all government agencies on a centralized basis, many multiple system orders will be placed at potentially large discounts.

- Less Federal money spent on rental ADPE. The Brooks Bill calls for rent-versus-purchase decisions to be based on all pertinent factors, including

usefulness of and need for the equipment from a government-wide standpoint. Since the GSA is empowered to find second and third users for ADPE released by the initial using agency, the effective useful life of the equipment within the government should be significantly extended ...justifying more purchase decisions. The government reasons that once the sum of rental payments equals the capital expenditure for the ADPE, the equipment can be used at a fraction of the cost of new equipment of equal capacity.

This attitude also justified the recent decision by the Comptroller General to sanction officially purchase—leaseback plans for the use of ADPE by government agencies. Under this arrangement a leasing company, acting as a third party, purchases the ADPE and leases it to the government at rental charges often 10% to 40% less than those charged by the equipment manufacturer.

- ADPE components will be individually specified and priced. Some type of procurement policy is expected to appear in the Brooks Bill implementation guidelines requiring manufacturers to provide specifications and prices on every significant ADPE component — that is, over-all system quotes will not be acceptable...a price breakdown of each major piece of a computer system configuration will have to be specified... and possibly even software! At present, procurement practices do not require this price separation when making lease-versus-purchase determinations; consequently, in the past these determinations have not been able to distinguish peripheral equipment that should be purchased from ones that should be rented.

  Of primary concern to the government is that in most instances manufacturers' sale and lease prices include the cost of software which, in some cases, approaches that of the hardware. Government officials feel that considerable economy could be effected when making multiple systems procurements if the software were separately priced and purchased only once. IBM, who supplies about 50% of the government ADPE, reportedly has been extremely reluctant to accept this premise, insisting that such a regulation would violate their sales policy and require a complete restructuring of their price schedules.

- Introduction of ADPE standards. Some type of uniform ADPE standards will evolve which — although developed in cooperation with computer manufacturers — could effect a change in the equipment produced by some or all ADPE suppliers. The big question is: Will these standards, developed through the NBS, be based on a complete and thorough analysis of industry and user requirements — both inside and outside the Federal government?

- Less growth in government ADPE procurement than previously forecasted. Less government expenditures will be made for future ADPE procurement than has been anticipated if full utilization of existing ADPE, as called for in the Brooks Bill, is realized. One of the aims of the bill is to make full use of government computer resources as quickly as possible. To some extent such a program is now in effect through cooperative sharing of computer facilities between agencies coordinated through GSA. Despite this effort, however, several hundred thousand hours of computer time are reportedly available each month to government agencies, but are not used. At the same time, additional computers

are being installed and computer time is being contracted for with outside organizations. The General Accounting Office estimates that the value of this unused computer capacity is $400 million a year.

As a partial solution to this problem, the Brooks Bill authorizes GSA to establish multiagency DP service centers for furnishing ADPE capacity to many users via the time-shared use of large computers.

Also, by working in close coordination and cooperation with other Federal agencies, the GSA administrator will direct the reuse of computers released by an agency. Previous experience has indicated to government ADPE administrators that although it might not be possible to specifically identify secondary users at the time general-purpose ADPE is originally acquired, secondary use can frequently be achieved.

- Development of a complete, continually-updated ADPE inventory and fiscal data report. A complete and continually updated inventory of government-operated ADPE and a systematic consolidation of fiscal data will be produced and made available to federal agencies (and possibly to computer manufacturers). Present inventories are incomplete and extremely inaccurate because they have been prepared by part-time, noncomputer-oriented help. Also, ADPE appropriations are scattered throughout the Federal budget. It is ironic that ADPE — which has such powers for data control — has not been used extensively in ADPE management!

There is also a possibility that contractor-operated ADPE will eventually be affected, although such a provision was specifically excluded from the bill before it was approved by Congress. BOB suggests that the lease-versus-purchase criteria imposed on Federal agencies should also be applied to cost-reimbursement type contracts. They also propose to limit computer costs to be paid by the government to ownership costs and require that contractors review excess government equipment before acquiring new equipment. The latter control could only be invoked, of course, if the government provided the manufacturers with adequate inventory information. The government's philosophy on the matter is that the contractor who uses government-owned ADPE to fulfill the requirements of a contract should not be concerned with how the equipment is acquired or financed.

What has been done since the Brooks Bill became law ?

During a recent interview, Mr. Cunningham admitted to us that his new BOB group is just getting its bearings. As an initial observation, however, he commented, "It should be possible to develop government-wide libraries of computer programs." He also has "...serious reservations about what manufacturers promise versus what they deliver," and feels, "manufacturers must define their equipment more precisely, particularly with regard to which part is software and which is hardware."

On the fact that government-owned or leased computers on contractor sites are not specifically included in the Brooks Bill, Mr. Cunningham comments, "This is a loose field, at present. The government has a large stake in the cost-reimbursable programs at contractor sites, thus should have something to say about how they're run."

Mr. Cunningham also stated that a complete GSA inventory of government-operated computer installations should be "completed before this summer." He

also mentioned that there is considerable discussion going on as to whether or not the American Standard Code for Information Interchange (ASCII) should be adopted.

In discussing the bill with us, Mr. Dwyer indicated that "GSA is still working with BOB to shake down the policy guidance letter. Although the bill is nonspecific as to how it should be implemented and does not include government computer installations on contractor sites, the executive branch has indicated it expects the implementers of the bill to do whatever is necessary to promote the purposes of the bill. In fact President Johnson said that he is going to see to it that the bill is properly implemented and will ensure the effective utilization of the program, even with regard to reimbursable-type contractors. Apparently, a tremendous lobby saw to it that the original wording of the bill which specifically included contractor sites was excised in House committee before the bill was passed. But the intent of the original bill can be carried out anyway because a revolving fund is provided to finance the undertaking. However, it might be wiser to follow the present course of action prescribed by the bill than trying to do the whole job at once."

Reactions of the computer manufacturers

When questioned by our staff, most computer manufacturers seemed reluctant to speculate about the effect the Brooks Bill is likely to have on their business. One exception was UNIVAC, whose V.P. for Federal Marketing, Lee Johnson, stated:

> "We do not object to the government keeping records, but we don't believe it is practical for a third party — that is, BOB or GSA — to be involved in the purchase of a computer. We believe that if an agency has a clear-cut idea of what it needs and wants, it should be able to specify the source — and that decision should be made promptly without a third party being empowered to change even one component of the system. However, we do not object to an agency which does not have ADPE expertise calling on GSA or NBS for assistance.
>
> "We believe that the GSA or BOB should make an accurate, up-to-date inventory of government-owned ADPE available to contractors as well as to government agencies. In this way, the companies could avoid spending time and money preparing proposals which would be rejected finally because such equipment is already available in the government inventory unbeknownst to the company. If such lists were distributed, the companies themselves could recommend considering the inventory equipment by the simple and inexpensive means of a letter.
>
> "Another factor to consider is response time to lease or purchase. Many times agencies call with an order they want delivered immediately. How much red tape would be involved in expediting such an order if the Brooks Bill administrators -- particularly GSA -- had to approve first? Essentially, we would like to see any third party cut out of the affair after the final papers are received from the agency requesting the ADPE.
>
> "As we see it, the powers of the GSA administrator are not those of a czar; rather, he is a coordinator charged with the responsibility for achieving economies through cooperatively interacting with other government agencies and the manufacturers."

IBM, with usual reserve, officially commented:

"Since there has been no document which — to our knowledge — sets forth the manner in which the government plans to implement the act, there is no basis upon which to make any comment at the present time."

A GE spokesman offered a market-oriented note:

"There is no doubt that implementation of the program will mean many more government time-sharing operations."

SDS's Don McGurk predicted that "The impact of the Brooks Bill on the computer industry will depend on whether the bill's administrators are going to apply strong system analysis and evaluation techniques, or whether they will simply rubber stamp agency proposals!"

Ed McCollister, V.P. of RCA's EDP Division, felt that "If the administrators of the Brooks Bill force a breakout of software prices from hardware costs in the manufacturer's proposal, it will cause a virtual revolution in the industry. Frankly, I do not think that the government will make this step, but if they do, it will be a healthy thing for the industry."

NCR's Russell Carter, Manager of Government Sales, said:

"We are somewhat concerned about the implications of volume procurements by GSA and the establishment of uniform Federal ADP standards by the NBS for the computer industry. If carried to a logical end, such a philosophy could result in the extreme of purchasing a single-type of computer system in volume for all applications, which would preclude the purchase of one or two systems from a different manufacturer, resulting in a reduction of competition, regardless of merit."

J. Paul Leebrick Manager of Federal Government Activity at Burroughs, commented:

"The imposition of more standardized procedures in responding to RFQ's should certainly be welcomed by the manufacturers.

"Of primary concern is the evaluation criteria to be utilized. Government agencies have differed greatly in the past in the weighting of evaluation criteria. Of additional concern is the communication link between the requesting agency and GSA. The system requirements must be clearly defined and documented in order that GSA can assure selection of the optimum equipment.

"Overriding all of these considerations is the question of the knowledgeability, competency, and effectiveness of the evaluation and selection group. In order to be successful this group must have the authority and stature to support their conclusions and actions."

A clear statement of the policies to be followed by the GSA in the implementation of the Brooks Bill will not be available until early this summer. However, even at this time, it is clear that implementation will encourage more uniformity between manufacturers' EDP equipment and wider use of computer compatibility

devices such as emulators and translators. Also, government computer equipment will be selected and procured more objectively, lessening the "salesmanship" aspect of computer sales and emphasizing the ability of the equipment to meet carefully defined performance requirements.

ITT STEPS UP ITS COMPUTER SERVICE ACTIVITY

ITT officials gave further assurance this past week of the company's belief that it can find a profitable future in services businesses when their Data Services Division formally opened its new computer center at 67 Broad Street in N. Y.'s Wall Street area.

The new facility uses an IBM 1460 computer and a 7711 data transmission system to communicate by high-capacity Telpak-A cable with ITT's $10 million computer complex in Paramus, N. J. The Wall Street Center is designed to bring the power of ITT's "computerplex" of IBM's 7090, 7070, 1460, and twin 1401 computers at its Paramus center within easy trotting distance of the offices of major financial and business firms in the Wall Street area.

This is the second such center that ITT has opened in the New York area during the past year. It, and the earlier one at Garden City, L. I., are part of the Data Services Division's program of Subscriber Data Processing Centers... a network of satellite computer centers planned for the Greater New York area. All these centers will be linked by high-speed data communication lines to the main Paramus facility. An advanced service...on-line terminals in customer offices...is scheduled to begin early in 1967 when a 360/67 time-sharing computer is installed in Paramus. Meanwhile, a 360/50 and 360/40 will be installed in Paramus later this year, with 360/30's being put into the Subscriber DP Centers.

ITT foresees a major place for itself in computer services, a market ITT expects to reach $1.2 billion by 1970. It plans to establish a series of data processing service center networks in major industrial and commercial areas around the world. Like the New York setup, these networks will consist of groups of smaller computer centers located near the doorsteps of major customers. These centers will operate as satellites to remote, large-scale "computerplexes." A second network to be established in the Los Angeles area and built on 360's, is expected to start service in April. Six ITT "computerplexes" are currently planned for Europe, each using a 360/67...three in France, two in Germany, and one in England.

The last service firm to start such an ambitious program of service centers was C-E-I-R, some four years ago. The effort was never realized due to shortages of capital, equipment, and personnel. It will be interesting to observe if ITT can surmount these barriers, particularly the last two, in the coming eighteen months.

IRS COMPUTERS SELF-FINANCING...AND THEN SOME

During the past four years, the Internal Revenue Service has spent approximately $64 million for the rental and purchase of computer systems to aid its

tax collection job. The result? According to IRS officials, computers have stimulated the collection of an extra $70 million in tax revenues that might otherwise go uncollected.

Some of the bonus came from voluntary antes from citizens intimidated by the "giant brain" aspect of the IRS's computers. Another part came because the computers were able to spot some 1.2 million missing business returns...creating tax claims which could still yield an additional $93.5 million. Still another came from the correction of arithmetic mistakes on tax returns...netting $9.5 million in Uncle Sam's favor.

The IRS currently monitors most business returns and about 30% of the individual returns on its computer systems. By 1967 the Service expects to have records on each taxable citizen logged in on its master file.

STOCK MARKET REPORT ON SELECTED EDP FIRMS

January 14, 1966 - March 11, 1966

	1965-66 High	1965-66 Low	8-week Sales in 100s	8-week High	8-week Low	Last	8-week Net Change	8-week % Change
NEW YORK STOCK EXCHANGE								
Addressograph-Multigraph	70 3/8	41 1/8	6887	70 3/8	54 1/8	64 1/8	+6 3/8	+10.97
American R & D	29 1/4	17 5/8	1529	29 1/4	22 1/4	27 5/8	+4	+16.93
Ampex Corp.	28 7/8	13 3/8	15,916	26 3/4	22	22 3/4	-2 1/4	- 9.00
Burroughs	65 1/4	24 7/8	17,346	65 1/4	50 5/8	59 1/2	+6 1/2	+12.26
Control Data	64 1/4	26 1/2	19,173	33 1/2	26 1/2	28 3/4	-4	-12.21
Dura Corp.	33 1/8	19 3/4	648	29 3/4	26 1/4	27 1/4	-1/4	- 0.90
Electronic Assoc.	32 3/8	16 3/4	3502	27 1/8	21 3/4	22 1/4	-2	- 8.25
General Dynamics	68 1/4	35	11,714	63 1/4	53	55	-2 1/2	- 4.33
General Electric	120 1/4	91	7547	118 1/4	106 1/8	109 5/8	-6 3/4	- 5.76
Honeywell	83 3/4	58 1/4	5303	83 3/4	68 1/2	80 1/4	+8 5/8	+11.98
IBM	549	404	3640	524 3/4	472	500	+5 1/2	+ 1.11
Inter. Tel. & Tel.	75	48 3/4	4946	75	66 3/4	69 3/4	-1	- 1.41
Litton	84 3/8	65 5/8	9093	84 3/8	66 1/2	72 7/8	+3 1/8	+ 4.48
Nat. Cash Register	91 3/4	69	3876	86 1/2	76	81 1/4	+1	+ 1.24
RCA	56	31	19,522	56	50	50 1/2	-1 3/4	- 3.33
Raytheon	51 1/2	19	23,485	51 1/2	36	45 1/8	+5 5/8	+14.24
SCM	62 5/8	16 1/4	17,680	59 3/8	48 3/4	52 5/8	+3 7/8	+ 7.95
Singer	83 1/4	55	4400	63 7/8	55	56 1/4	-6 5/8	-10.43
Sperry Rand	24	11 1/8	43,536	22	17 1/8	18 7/8	-2 1/2	-11.70
NYSE COMPUTER STOCK AVERAGE							+0.79	+ 0.73
AMERICAN STOCK EXCHANGE								
ANelex	39	19 3/4	812	24 3/4	21 1/4	21 3/8	-3 1/4	-13.20
Bunker-Ramo	11 3/8	5 7/8	3264	9 1/4	7 5/8	8	+1/4	+ 3.23
Cal Comp	24	13	455	16	13 5/8	13 3/4	-1 7/8	-12.00
Clary	6 1/8	3 1/8	837	6	4 5/8	4 7/8	-1/2	- 9.30
Computer Application	32 1/4	15 3/4	1775	24	20 1/8	22 7/8	-1	- 4.19
Computer Science	34 7/8	19 1/8	9575	34 7/8	20 1/4	25 3/4	+5 1/8	+24.70
Milgo Elect.	12 5/8	6 5/8	470	8 3/4	7	8	-1/4	- 3.03
Planning Research	39 7/8	12 1/8	916	33 3/8	25	25	-8 1/8	-24.53
Potter Instrument	24 1/4	6 5/8	1849	24 1/4	15 5/8	20 1/8	+1 7/8	+10.49
AMEX COMPUTER STOCK AVERAGE							-0.86	- 3.09

	1966 High Bid	1966 Low Bid	March 11 Bid	March 11 Asked	8 weeks ago Bid
OVER-THE-COUNTER					
CEIR	15 1/4	13 3/8	13 3/8	13 5/8	15
Computer Usage	23 3/4	18 1/2	19 3/4	21 3/4	22 1/2
Computer Control	22 1/4	14	22 1/4	22 3/4	17 3/8
Digitronics	12 3/4	8 5/8	9 3/8	9 7/8	10 1/2
Management Assistance	45 3/4	34	34	35	36
Scientific Data	62	44	58 1/2	59 1/2	49 3/4

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E|D|P
INDUSTRY AND MARKET REPORT

A SEMI-MONTHLY NEWSLETTER FOR EXECUTIVES IN THE ELECTRONIC DATA PROCESSING INDUSTRY, AND THE FINANCIAL COMMUNITY.

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SIGMA SERIES SIGNALS SDS'S BID TO CAPTURE 3% OF COMPUTER MARKET BY 1970

As the only computer manufacturer other than IBM to show a growing profit from its computer business during the last three years, Scientific Data Systems' new product line for competition in the third-generation computer market was awaited with anticipation. On March 15th, SDS released the tension by revealing the first member of a new series of real-time computer systems, designed for operation in what SDS terms "multi-usage" environments.

Called Sigma 7, the new unit is a medium-sized system priced from $200,000 to $1,000,000, depending on its configuration. SDS claims it has three times the computation power of any other computer in its price class. Initial deliveries are expected late this fall. Other members of the Sigma series (three smaller, and perhaps one larger model) are expected to be introduced next year.

SDS's Current Market Position

In order to put the technical characteristics and market potential for Sigma 7 into perspective, let's review for a moment SDS's current position in the computer market.

SDS now has over 450 of its Series 900 computer systems installed in some 20 countries. A large number of these units are employed as "processor modules" in process control systems, event simulators, data reduction systems, character recognition units, etc. . .situations where a minimal amount of software support is required. Only a small percentage of SDS computers have been used as truly general-purpose problem solvers. Largely because of this, the Federal Government has accounted for 60-65% of SDS's computer sales.

The multi-usage concept behind the design of Sigma 7 has appeal to a potentially far larger segment of the digital computer market than SDS's products have served in the past. In fact SDS's President Max Palevsky predicts that Sigma series sales will help push the value of SDS computer equipment shipped during 1970 to $200 million, an increase of 4 times over the $50 million shipped in 1965. As such, Palevsky foresees SDS capturing 3% of the computer market by 1970 when he expects annual shipments in the industry to top $7 billion.

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SDS has shipped over $100 million worth of computers since its founding in 1961; at its current shipping rate it is accounting for just under 2% of the annual volume in the industry. The company's impressive business performance during that time is summarized below:

	1965	1964	1963	1962
Total Revenues	$43,999,295	$20,486,789	$7,721,537	$1,005,681
Net Income (loss) After Taxes. .	3,371,628	2,179,399	1,310,564	(511,411)
Net Income Per Common Share. . .	$1.51*	$1.02	$0.69	($0.27)
Number of Employees.	2,373	1,357	438	166

*After payment of dividends on preferred stock.

Evaluation of Current Product Line

Of course, SDS's success with its new Sigma series will be shaped in part by the degree of success SDS has had in serving the needs of its current customers. To assess this, we conducted during the past week a telephone survey of a sample of current users of SDS computers. Several users of each type of system were questioned. We asked each user the following questions:

1. How do you rate the performance of SDS's computer hardware in light of your expectations for it?

2. How do you rate SDS's software and programming support for your system?

3. How do you rate SDS's maintenance service for your system?

4. How do you rate SDS's training program for your personnel?

5. What is your over-all evaluation of SDS? What are the chances your next computer will be from SDS?

This survey provided the following analysis of SDS's current product line:

SDS 910/920

Current Status: The SDS 910 is a small, fast system computer suited for real-time systems integration and scientific computation. It has an 8-microsecond core memory cycle with memory sizes from 2K to 16K words. Word length is 24 bits. Typical monthly rental is $2000; first delivery in August, 1962. The 920 is an enhanced 910 offering faster multiply and divide operations and additional instructions for floating-point arithmetic. Typical monthly rental is $2700; first delivery in September, 1962. (See computer census this issue for installation statistics on these and other SDS computers.)

Customer Survey

Hardware Performance: Very good.

Software Support : Users tend to use their own programs. What software is provided was delivered with the system and considered adequate.

Maintenance Service : Comments ranged from "very good" to "no maintenance required at all".

Customer Training : Those interviewed did not request training.
Over-all Evaluation : Users seemed very satisfied with SDS's system. In most cases, the SDS computer was part of a special system. System change was considered three to four years away. In cases where the user bought the computer directly from SDS he is likely to go back to SDS for new equipment.

SDS 925

Current Status: The SDS 925 is an upgraded version of the 910, featuring a 1.75-microsecond memory cycle. Additional input/output and communications capabilities are provided with the system. Typical monthly rental is $2500; first delivery in December, 1964.

Customer Survey

Hardware Performance: Over-all performance rated as very good. However, miniature magnetic tape units have been a problem in some cases. Also delivery of the RAD disc file and system interfaces has been slow.
Software Support : Good, but delivery slow.
Maintenance Service : Very good to excellent.
Customer Training : Good in cases where requested.
General Evaluation : Users reasonably happy with SDS computers and would consider them favorably in purchasing new equipment. Equipment replacement three to four years away.

SDS 930

Current Status: The SDS 930 is basically the SDS 925 with an expanded instruction set and built-in multiply and divide logic circuitry. Maximum memory size is increased to 32K words. Typical monthly rental is $4000; first delivery in June, 1964. A 940, a time-sharing version of the 930, has recently been announced.

Customer Survey

Hardware Performance: Core stacks and miniature magnetic tape units have been trouble spots. Delivery of peripheral equipment, particularly of RAD disc files, has been very slow. One user reports excessive down-time with a very short mean-time-between-failures.
Software Support : Delivery of initial software as well as changes in software reported as very slow. Some difficulties are reported in using assembly language. FORTRAN IV compiler, however, was rated by one user as better than IBM's version for the 360/40.
Maintenance Service : Excellent.
Customer Training : Little training was requested, but what was provided was good.
General Evaluation : Although some users indicated the 930 could be replaced right now with something smaller, others indicated no change planned until 1968. SDS has a good chance to provide next computer. Several users thought that Sigma 7 looked "very, very attractive" to them.

SDS 9300

Current Status: The SDS 9300 is a general-purpose computer with features designed for the scientific/industrial user. It offers the computing power of

a 930 plus floating-point arithmetic and overlapping memory cycles for reduced access time. Typical monthly rental is $7000; first delivery in November, 1964.

Customer Survey

Hardware Performance:	Good to very good, although software problems have tended to blur image of hardware reliability.
Software Support :	Delivery has been very late. Software provided was given a modest "adequate" rating.
Maintenance Service :	Good.
Customer Training :	Very good.
General Evaluation :	Users look at the 9300 as an interim computer. They plan a change within one to two years. SDS "will be considered" for the next computer.

SDS 92

Current Status: The SDS 92 is a low-cost systems computer designed for data collection, reduction, distribution and control systems. It is SDS's first computer to use monolithic integrated circuits. The word length is 12 bits; otherwise the technical specifications are similar to the SDS 925. Typical monthly rental is $1100; first delivery in April, 1965.

Customer Survey

Hardware Performance:	Quite satisfactory. However, slow delivery reported. Difficulty reported in getting description of interface requirements.
Software Support :	Adequate (minimum required).
Maintenance Service :	Adequate, although one academic user (14% discount) felt ignored.
Customer Training :	Limited amount available.
General Evaluation :	Continued use for two to three years expected. Customers will probably buy again from SDS (price/performance of the equipment outweighed limited service and training).

Characteristics of the Sigma 7

Key technical characteristics of the new Sigma 7 computer include:

Memory Capacity:	524,288 8-bit bytes (4,096 to 131,072 words). Expansible in increments as low as 4K words into 32 different memory sizes.
Memory Cycle Time:	1.2 microseconds; 700 nanoseconds when access overlapping occurs.
Word Size:	32 bits (four 8-bit bytes) plus parity.
Registers:	16 - expansible in blocks of 16 to a total of 512
Major Instructions:	110; also optional floating point hardware.
Instruction Execution Speeds (Microseconds):	Load word 2.0 Multiply 4.9 Add 2.0 Divide 12.5
Maximum Number of External Priority Interrupts:	224

Special Features:	Overlapping, Interleaving, Mapping, Multiple Register Blocks, Memory Protect, Real-Time Clocks, Input/Output Processors, Asynchronous Operation, Monolithic Integrated Circuits
Maximum Number of Input/ Output Devices:	256

Multi-Usage Concept

SDS's motivation behind the design of Sigma 7 is summarized by one of the system's planners, Jerry Mendelson, Manager, Product Planning at SDS: "Main frame performance levels (of third generation computers) have so far outstripped the capabilities of other elements of computer systems that the keynote of system design has become one word -- multi-usage. Sigma's design objective is to permit any combination of real-time operation, time sharing, multiprogramming and multiprocessing within a single operating system and at a cost that makes such a system available to the broadest segment of the market."

Sigma 7 is essentially a memory-oriented system containing a central processor, one or more I/O processors, and one or more memory modules. SDS expects it to perform capably on a real-time basis in each of three main operating modes:

Multi-processing: simultaneous execution of one or more programs in a single computing system containing two or more processors, using a common memory pool.

Multi-programming: time-multiplexed operation of two or more independent programs in the same processor.

Time-sharing: on-line, interactive use of the processor and supporting software by separate users working at remote consoles.

For example, SDS foresees a Sigma 7 system processing matrix and inventory control problems on a batch basis while servicing at the same time scores of nationwide users at remote consoles in such a way that each thinks he has the complete attention of the computer.

For such real-time applications, a computer must be able to recognize and respond to external signals, preserve the current status of the system, and maintain control over all peripheral devices. Sigma 7 offers several advanced features to accomplish this. For example, when a new set of interrupt-initiated events occur, Sigma 7 promptly stores the operating status of the current program, such as program address, current general register block, memory protection key, etc., in a 64-bit program status double word. A single instruction stores this word anywhere in memory and loads a new one to establish a new environment. This includes the assignment of a new block of 16 32-bit registers which serve as the accumulator and general index registers for the new program being processed by the computer. Thus Sigma 7 can completely change its operating environment in the 6 microseconds it takes to execute this one instruction.

Sigma 7 also offers three advanced techniques of memory operation: overlapping, interleaving, and mapping. Overlapping allows the computer to do calculations on data from one of its memory modules while simultaneously performing other operations, such as peripheral control, in other memory modules.

Interleaving memory addresses permits Sigma 7 to distribute memory accesses among as many as four independent memory modules. Combined with overlapping, interleaving can almost cut in half the effective access time of Sigma 7's memory.

Mapping provides a memory management feature critical in time-sharing operations. By mapping, the computer routes 512-word sections (pages) of each user's program into the available portions of memory, no matter how scattered these may be. The mapping feature automatically adjusts addressing so that the program appears to the user as though it occupies a single contiguous block of memory. Mapping also allows the same program to flow in and out of memory many times, occupying different segments each time.

Sigma's Software

As one would expect, the multi-usage potential of SDS's new computer requires that it have substantially more software than any of the previous computers in the company's product line. For example, SDS's first computer, the 910, had only 4000 instructions in its complete software. Sigma 7 is expected to have some 80,000 instructions in its software when first delivered and eventually to have over 250,000 instructions in its software when all programming levels are available.

Operating systems being written for Sigma 7 include:

Basic Control Monitor: to permit simultaneous operations of real-time foreground programs with general-purpose background processing.

Batch Monitor: to permit background and foreground operation simultaneously with concurrent I/O operations.

Universal Time-Sharing Monitor: to supplement the batch monitor capabilities with automatic swapping to and from secondary storage, tertiary mass memory control, and tasking in a time-sharing environment.

Compilers for PL/I, the new scientific/business language created by IBM for the 360, and for FORTRAN IV, are being written for Sigma 7. Both these implementations will offer extended features for real-time and interactive computer use. Assemblers with Sigma 7 include both a basic symbolic assembly program as well as a meta-symbol assembler which provides for procedure and function handling within the basic assembly system.

Business software includes MANAGE, a system for data file organization, creation, processing and management. A report generator and a sort/merge package is also offered.

Peripheral Equipment

Peripheral equipment offered with Sigma 7 includes a keyboard printer, paper tape reader and punch, card readers and punches, random-access disc

file, 7- and 9-channel magnetic tape, 600 and 1000 line per minute printers, visual display units, and communications interface equipment.

Compatibility

Sigma 7 is not directly program compatible with any of SDS's previously announced computers, nor with any competitive equipment. However, its bit structure, data codes, and floating-point arithmetic are compatible with IBM 360 computers, thereby allowing direct data interchange through a communications link. Also, source-level program compatibility will exist with a competitive computer to the extent that Sigma 7's implementation of PL/I and FORTRAN IV is similar to that used with the other equipment.

Prospects for the Sigma Series

SDS's success in achieving its stated goal of 3% of the computer market by 1970 will, we believe, depend on five factors:

(1) ability to continue to serve its current markets with the Sigma series;
(2) introduction of reliable random-access memory devices;
(3) acquisition of competent people;
(4) development of efficient software; and
(5) control over its investment in equipment leased to customers.

SDS's strategy in introducing the higher end of the Sigma series at this time appears to be to garner the publicity and prestige associated with announcing a sophisticated computer system designed to serve users pioneering such advanced computer concepts as time-sharing. However, the introduction of a Sigma 2 or Sigma 3 in the $25,000 to $100,000 price range should allow SDS to continue to participate in its traditional, and currently profitable, market for fast, real-time system computers.

A critical requirement for a computer system offered in the market for multi-user time-sharing systems is adequate mass random-access storage space. Currently SDS's home-built disc file (its RAD unit) has a maximum storage capacity of only 8 million characters per unit. . .hardly enough to service 20 users in a time-sharing environment, no less the 200 SDS claims its Sigma 7 processor can accommodate. Although SDS says IBM data cells and disc files can be hooked-up to its system, such a configuration puts a large share of the value of the system in the hands of its leading competitor. SDS is currently developing its own mass storage system with a capacity of upwards of 100 million bytes. If they can make this unit reliable and deliver it within the next eighteen months, their competitive position in the time-sharing market will be taken a great deal more seriously. However, as indicated in our customer survey, the difficulty SDS is experiencing in getting its current RAD unit to operate reliably makes this development seem unlikely.

The need for competent people and the need for efficient software go hand in hand in shaping the success of the Sigma series. The most limited resource in the computer industry today is skilled, experienced people who can design and create the programming systems needed for the effective use of sophisticated computers and trained, competent people who can sell, service, and manage the

use of these computer systems. The programming investment for Sigma 7 software is likely to exceed $1.5 million; how effective this investment will be depends on the quality of the people SDS is able to attract and employ to do this work.

SDS has been able to acquire excellent people in the past by offering the freedom and challenge of a small company environment along with attractive stock options. Now a maturing company with over 2500 employees, SDS's ability to offer these attractions to creative people is being steadily reduced This "manpower gap" could be the critical path in the growth of a company like SDS that likes to stress quality, rather than quantity, as its staffing philosophy. As one user puts it "SDS is terribly understaffed. However, the people they do have are quite competent. SDS is probably growing too fast to keep up. . . besides, understaffing seems to be a company policy". Or, as President Palevsky put his manpower policy, "If a job requires ten people, putting five on it will get it done faster" (as quoted recently in Newsweek). SDS's progress in the computer business might well be forecasted by an astute reader of the "people" section of the trade press.

The software that SDS has been able to provide for its 9300 computer, the one computer in its product line designed for the same market as the Sigma 7, has been rated as only"adequate". In several installations the delivery of software for the 9300 is reported as considerably behind schedule. The expanded and complex software requirements of the Sigma series makes one wonder if SDS is not highly optimistic in expecting to deliver Sigma 7 in late fall with adequate software. Since the experiences of early users of a new computer series are regularly reviewed by prospective customers, inadequate or late software could well hurt the market acceptance of the Sigma 7.

The use of a high percentage of SDS 900 series computers as processor modules has allowed SDS to sell outright over 60% of their systems shipped last year. Computers in the price range of Sigma 7 and used for general-purpose applications are usually over 70% leased. If SDS does install $300 million worth of Sigma equipment by 1970 at these higher leasing ratios, it will need to make an investment of over $100 million for the production of computer systems leased to customers. To prevent a dangerous restriction of its working capital, SDS will have to control the percentage of customers it accepts on a short-term leasing basis. Without this control, SDS will have to limit its growth aspirations or else attempt to raise substantial amounts of additional capital. SDS realizes that customer confidence is the key to achieving a high number of purchases or long-term leases in the medium-scale computer market... making the necessity for effective software all the more important.

In summary, we believe that the real "pay dirt" part of the Sigma series will prove to be the low end. Sigma 7 and any larger model that might be introduced will be limited by software support and random-access memory capability. The mid-section of the Sigma series ($100,000 - $400,000, Sigma 4,5?) will face stiff competition from the IBM 1800 and 1130, and the Control Data 1700 systems. However, the low-end Sigmas should find widespread acceptance in telemetry and data communications processors, process instrumentation controllers, graphic data recognition and processing units, and other roles in the rapidly growing market for real-time system computers. In fact, through its acquisition of Consolidated Systems Corporation early last year, SDS has developed a Data Systems division that has enjoyed considerable success in developing complete systems built around SDS computers for application in indus-

trial control, seismic digital recording, mass spectrometry, digital command systems, and spaceborne data management systems. Sales of such systems accounted for nearly half of SDS's revenues in 1965. The processing capability of the Sigma series should substantially strengthen SDS's competitive position in bidding on such system sales.

NUMBER OF COMPUTERS IN EUROPE INCREASES BY 24% DURING 1965

The number of digital computers installed in Western Europe increased by 24% during 1965, from 5996 installed at the end of 1964 to 7480 installed at the end of last year. The value of computer systems increased even more sharply, rising some 27%, from $1.8 billion at the end of 1964 to $2.3 billion at the end of last year. These figures are based on a recently completed market study of computer installations in Western Europe conducted by the International Data Corporation.

Fastest growing market for computers in Europe last year was West Germany which experienced a 32% increase in the number of computer systems installed. West Germany is also the leading user of digital computers in Europe. Italy experienced the slowest growth rate of the countries surveyed, 14%. This was due in part to the reorganization of its leading indigenous computer manufacturer, C. Olivetti & Co., following acquisition of that firm by General Electric in 1964.

A summary of the census figures for each of the countries covered in the study is provided below:

Census of Digital Computer Installations in Western Europe

Country	Number of Computer Systems Installed End 1964	Number of Computer Systems Installed End 1965	% Increase During 1965
Austria	108	134	24%
Belgium	232	281	21%
Denmark	95	124	27%
Finland	54	64	18%
France	1090	1320	21%
Great Britain	950	1225	29%
Greece	67	80	20%
Ireland	40	49	23%
Italy	880	1000	14%
Netherlands	275	347	26%
Norway	110	132	20%
Portugal	30	38	27%
Spain	40	47	17%
Sweden	260	333	28%
Switzerland	265	326	23%
West Germany	1500	1980	32%
TOTAL	5996	7480	24%

MONTHLY COMPUTER CENSUS

The number of electronic digital computers installed or in production at any one time has been increasing at a bewildering pace in the past several years. New vendors have come into the market, and familiar machines have gone out of production. Some machines have been received with open arms by users -- others have been given the cold shoulder.

To aid readers of the EDP I&MR in keeping with this mushrooming activity, we compile and publish this monthly report on the number of general purpose electronic computers made by American-based companies which are installed or on order as of the preceding month. These figures included installations and orders outside the United States. We update this computer census monthly, so that it will serve as a "box score" of progress in following the growth of the American computer industry, and of the computing power it builds.

In general, manufacturers in the computer field do not officially release installation and on order figures. The figures in this table are developed through a continuing market survey conducted by our research staff. This market research program develops a documented data file on over 80% of the computer installations in the United States. A similar program is conducted for overseas installations.

Comments on this census from informed readers will be welcomed.

AS OF FEBRUARY 10, 1966

NAME OF MANUFACTURER	NAME OF COMPUTER	SOLID STATE?	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS	NUMBER OF UNFILLED ORDERS
Advanced Scientific Instruments	ASI 210	Y	$2850	4/62	24	0
	ASI 2100	Y	$3000	12/63	6	1
	ADVANCE 6020	Y	$2200	4/65	5	5
	ADVANCE 6040	Y	$2800	7/65	3	6
	ADVANCE 6050	Y	$5000	10/65	0	4
	ADVANCE 6070	Y	$10,500	10/65	1	6
	ADVANCE 6080	Y	$7000	1/66	0	0
Autonetics	RECOMP II	Y	$2495	11/58	46	X
	RECOMP III	Y	$1495	6/61	10	X
Bunker-Ramo Corp.	BR-130	Y	$2000	10/61	158	5
	BR-133	Y	$2400	5/64	13	4
	BR-230	Y	$2680	8/63	15	X
	BR-300	Y	$3000	3/59	38	X
	BR-330	Y	$4000	12/60	34	X
	BR-340	Y	$7000	12/63	20	X
Burroughs	205	N	$4600	1/54	51	X
	220	N	$14,000	10/58	42	X
	E101-103	N	$875	1/56	148	X
	B100	Y	$2800	8/64	120	20
	B250	Y	$4200	11/61	95	4
	B260	Y	$3750	11/62	220	14
	B270	Y	$7000	7/62	145	13
	B280	Y	$6500	7/62	118	17
	B300	Y	$8400	7/65	64	105
	B5000/B5500	Y	$20,000	3/63	49	10
	B8500	Y	$200,000	2/67	0	1
Clary	DE-60/DE-60M	Y	$525	7/60	347	4
Computer Control Co.	DDP-24	Y	$2500	5/63	70	8
	DDP-116	Y	$900	4/65	40	45
	DDP-124	Y	$2050	2/66	0	9
	DDP-224	Y	$3300	3/65	18	15
Control Data Corporation	G-15	N	$1000	7/55	311	X
	G-20	Y	$15,500	4/61	23	X
	LGP-21	Y	$725	12/62	100	X
	LGP-30	semi	$1300	9/56	300	X
	RPC-4000	Y	$1875	1/61	50	X
	160*/160A/160G	Y	$1750/$3400/$12,000	5/60;7/61;3/64	450	1
	924/924A	Y	$11,000	8/61	30	X
	1604/1604A	Y	$45,000	1/60	58	X
	1700	Y	$2200	5/66	0	30
	3100	Y	$7350	12/64	60	36
	3200	Y	$12,000	5/64	94	18
	3300	Y	$15,000	9/65	3	35
	3400	Y	$25,000	11/64	18	18
	3500	Y	$30,000	6/66	0	4
	3600	Y	$58,000	6/63	49	10
	3800	Y	$60,000	2/66	0	16
	6400	Y	$40,000	1/66	0	11
	6600	Y	$110,000	8/64	8	5
	6800	Y	$140,000	4/67	0	2
Digital Equipment Corp.	PDP-1	Y	$3400	11/60	60	X
	PDP-4	Y	$1700	8/62	55	2
	PDP-5	Y	$900	9/63	112	1
	PDP-6	Y	$10,000	10/64	14	7
	PDP-7	Y	$1300	11/64	51	50
	PDP-8	Y	$525	4/65	130	275
El-tronics, Inc.	ALWAC IIIE	N	$1820	2/54	21	X
Electronic Associates, Inc.	8400	Y	$7000	6/65	4	6
Friden	6010	Y	$600	6/63	325	179
General Electric	115	Y	$1375	12/65	15	410
	205	Y	$2900	6/64	42	8
	210	Y	$16,000	7/59	52	X
	215	Y	$6000	9/63	54	2
	225	Y	$8000	4/61	150	2
	235	Y	$10,900	4/64	64	8
	415	Y	$7300	5/64	93	61
	425	Y	$9600	6/64	54	50
	435	Y	$14,000	10/64	22	25
	625	Y	$41,000	12/64	12	26
	635/645	Y	$45,000	12/64	4	28
Honeywell Electronic Data Processing	H-120	Y	$2600	1/66	15	270
	H-200	Y	$5700	3/64	560	100
	H-400	Y	$8500	12/61	122	5
	H-800	Y	$22,000	12/60	86	3
	H-1200	Y	$6500	2/66	0	42
	H-1400	Y	$14,000	1/64	12	1

NAME OF MANUFACTURER	NAME OF COMPUTER	SOLID STATE?	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS	NUMBER OF UNFILLED ORDERS
Honeywell (cont'd)	H-1800	Y	$30,000	1/64	16	6
	H-2200	Y	$11,000	1/66	1	44
	H-4200	Y	$16,800	2/66	0	8
	H-8200	Y	$35,000	3/67	0	3
	DATAmatic 1000	N	$40,000	12/57	4	X
IBM	305	N	$3600	12/57	168	X
	360/20	Y	$1800	12/65	30	4100
	360/30	Y	$7200	5/65	650	3200
	360/40	Y	$14,500	4/65	475	900
	360/44	Y	$12,000	9/66	0	400
	360/50	Y	$28,000	8/65	21	360
	360/62	Y	$55,000	11/65	1	X
	360/65	Y	$46,000	11/65	2	110
	360/67	Y	$49,000	9/66	0	24
	360/75	Y	$78,000	2/66	0	68
	360/90 Series	Y	$140,000	6/67	0	6
	650	N	$4800	11/54	250	X
	1130	Y	$850	11/65	30	2000
	1401	Y	$4500	9/60	6600	180
	1401-G	Y	$2000	5/64	1350	60
	1410	Y	$14,200	11/61	740	20
	1440	Y	$3300	4/63	2800	220
	1460	Y	$9000	10/63	2250	160
	1620 I, II	Y	$2500	9/60	1700	20
	1800	Y	$3700	1/66	0	140
	701	N	$5000	4/53	1	X
	7010	Y	$22,600	10/63	185	25
	702	N	$6900	2/55	8	X
	7030	Y	$160,000	5/61	7	X
	704	N	$32,000	12/55	38	X
	7040	Y	$18,000	6/63	115	8
	7044	Y	$35,200	6/63	120	20
	705	N	$30,000	11/55	61	X
	7070, 2, 4	Y	$27,000	3/60	335	5
	7080	Y	$55,000	8/61	75	X
	709	N	$40,000	8/58	11	X
	7090	Y	$63,500	11/59	43	1
	7094	Y	$72,500	9/62	122	5
	7094 II	Y	$78,500	4/64	109	20
ITT	7300 ADX	Y	$18,000	9/61	9	6
Monroe Calculating Machine Co.	Monrobot IX	N	Sold only - $5800	3/58	150	X
	Monrobot XI	Y	$700	12/60	580	100
National Cash Register Co.	NCR - 304	Y	$14,000	1/60	26	X
	NCR - 310	Y	$2000	5/61	21	X
	NCR - 315	Y	$8500	5/62	385	60
	NCR - 315-RMC	Y	$12,000	9/65	8	25
	NCR - 390	Y	$1850	5/61	1070	35
	NCR - 500	Y	$1500	10/65	150	750
Philco	1000	Y	$7010	6/63	20	0
	2000-210, 211	Y	$40,000	10/58	18	1
	2000-212	Y	$52,000	1/63	10	1
Radio Corporation of America	Bizmac	N	$100,000	-/56	3	X
	RCA 301	Y	$6000	2/61	643	5
	RCA 3301	Y	$11,500	7/64	49	18
	RCA 501	Y	$14,000	6/59	99	2
	RCA 601	Y	$35,000	11/62	4	X
	Spectra 70/15	Y	$2600	9/65	14	80
	Spectra 70/25	Y	$5000	9/65	6	40
	Spectra 70/35	Y	$7000	11/66	0	35
	Spectra 70/45	Y	$9000	11/65	3	120
	Spectra 70/55	Y	$14,000	5/66	0	12
Raytheon	250	Y	$1200	12/60	172	2
	440	Y	$3500	3/64	14	3
	520	Y	$3200	10/65	3	5
Scientific Control Systems	650	Y	$500	12/65	0	2
	660	Y	$2000	10/65	2	1
	670	Y	$2600	12/65	0	2
Scientific Data Systems, Inc.	SDS-92	Y	$775	4/65	32	40
	SDS-910	Y	$2000	8/62	160	13
	SDS-920	Y	$2700	9/62	104	12
	SDS-925	Y	$2500	12/64	15	33
	SDS-930	Y	$4000	6/64	83	30
	SDS-9300	Y	$7000	11/64	24	10
Systems Engineering Labs	SEL-810	Y	$750	9/65	4	13
	SEL-840	Y	$4000	11/65	2	3
UNIVAC	I & II	N	$25,000	3/51 & 11/57	28	X
	III	Y	$20,000	8/62	85	1
	File Computers	N	$15,000	8/56	18	X
	Solid-State 80 I, II, 90 I, II & Step	Y	$8000	8/58	280	X
	418	Y	$11,000	6/63	60	28
	490 Series	Y	$35,000	12/61	85	60
	1004	Y	$1900	2/63	3300	160
	1005	Y	$2400	2/66	0	150
	1050	Y	$8000	9/63	280	80
	1100 Series (except 1107 & 1108)	N	$35,000	12/50	12	X
	1107	Y	$60,000	10/62	29	2
	1108	Y	$65,000	9/65	5	16
	LARC	Y	$135,000	5/60	2	X
				TOTALS	31,968	16, 187

X = no longer in production.

* To avoid double counting, note that the Control Data 160 serves as the central processor of the NCR 310. Also, many of the orders for the IBM 7044, 7074, and 7094 I and II's are not for new machines but for conversion from existing 7040, 7070 and 7090 computers respectively.

STOCK MARKET REPORT ON SELECTED EDP FIRMS

March 11, 1966 - April 8, 1966

	1966 High	1966 Low	4 weeks Sales in 100's	4 weeks High	4 weeks Low	Last	4 weeks Net Change	4 weeks % Change
NEW YORK STOCK EXCHANGE								
Addressograph-Multigraph	75	54 1/8	4086	75	61 1/4	74 7/8	+10 3/4	+16.38
American R & D	29 1/4	20 1/4	331	28 3/8	25 1/8	27 5/8	---	---
Ampex Corp.	26 3/4	19 5/8	8090	23 7/8	19 5/8	22 1/2	-1/4	-1.10
Burroughs	69 1/4	49 1/4	6918	69 1/4	56 5/8	68 3/4	+9 1/2	+15.97
Control Data	38 1/4	26 3/8	3854	30 7/8	26 3/4	28 5/8	-1/8	-0.43
Dura Corp.	33 1/4	25	345	33 1/4	26 3/4	32 3/4	+5 1/2	+20.18
Electronic Assoc.	27 1/8	20 1/8	1314	24 1/4	20 1/8	22 1/2	+1/4	+1.12
General Dynamics	63 1/4	51 1/2	5588	62 1/4	51 1/2	61 3/8	+6 3/8	+11.59
General Electric	120	106 1/8	3393	111 5/8	107 1/8	109 1/8	-1/2	-0.46
Honeywell	93 7/8	68 1/2	2115	93 7/8	76 3/4	93 1/2	+13 1/4	+16.51
IBM	540	472	1079	540	496 1/2	540	+40	+8.00
Inter. Tel & Tel	75	65 3/4	2383	73 1/4	65 3/4	73 1/4	+3 7/8	+5.56
Litton	86 1/2	66 1/2	5269	86 1/2	68 3/4	83 3/4	+10 7/8	+14.92
Nat. Cash Register	91 1/2	76	1803	91 1/2	80 5/8	90 3/8	+9 1/8	+11.23
RCA	56 1/2	46 1/8	10,916	56 1/2	47 3/4	56 1/8	+5 5/8	+11.14
Raytheon	51 3/4	36	12,823	51 3/4	41 5/8	50 1/4	+5 3/8	+11.91
SCM	71 3/8	47 1/4	16,569	71 3/8	47 3/4	70 1/8	+17 5/8	+33.49
Singer	64 3/4	55	1149	58 3/8	55	55 3/8	-7/8	-1.56
Sperry Rand	22 7/8	17 1/8	15,597	22	17 7/8	20 7/8	+2	+10.60
NYSE COMPUTER STOCK AVERAGE							+7.28	+9.74
AMERICAN STOCK EXCHANGE								
ANelex	28	20 1/2	770	28	20 1/2	23 7/8	+2 1/2	+11.70
Bunker-Ramo	9 1/4	7 1/4	1597	9 1/4	7 1/4	9 1/4	+1 1/4	+15.63
Cal Comp	17	13 1/4	539	17	13 1/4	17	+3 1/4	+23.64
Clary	6 1/2	4 5/8	875	6 1/2	4 3/4	6 3/8	+1 1/2	+30.77
Computer Applicat.	26 1/4	19 1/2	637	23 1/2	19 1/2	23 1/2	+5/8	+2.73
Computer Sciences	34 7/8	19 1/8	1290	28	22 3/4	27 1/2	+1 3/4	+6.80
Milgo Elect.	8 3/4	6 7/8	191	8 1/8	6 7/8	7 3/8	-5/8	-7.81
Planning Res.	36 1/2	23 5/8	283	27 5/8	23 5/8	25 1/2	+1/2	+2.00
Potter Instrument	24 1/4	14 5/8	579	22 1/4	17 1/4	21 3/4	+1 5/8	+8.07
AMEX COMPUTER STOCK AVERAGE							+1.38	+1.04

	1966 High Bid	1966 Low Bid	April 7 Bid	April 7 Asked	4 weeks ago Bid
OVER-THE-COUNTER					
CEIR	15 1/4	11 7/8	12 5/8	12 7/8	13 3/8
Computer Usage	23 3/4	17 3/4	18 1/2	20 3/8	19 3/4
Computer Control	25	14	25	25 1/2	22 1/4
Digitronics	12 3/4	8 5/8	11 3/8	11 7/8	9 3/8
Management Assistance	45 3/4	33	36 7/8	37 1/4	34
Scientific Data Systems	74 1/2	44	74 1/2	75 1/2	58 1/2

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April 25, 1966 Vol. 2, No. 3

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E|D|P
INDUSTRY AND MARKET REPORT

A SEMI-MONTHLY NEWSLETTER FOR EXECUTIVES IN THE ELECTRONIC DATA PROCESSING INDUSTRY, AND THE FINANCIAL COMMUNITY.

P. J. McGovern, Editor
Telephone 617-332-8840

Ahead of the news. . . . .

IBM SETS FOR INTRODUCTION OF TWO NEW PROCESSORS IN 360 SERIES: MODELS 46 AND 56 DESIGNED FOR TIME-SHARING MARKET

Advance word reaching us indicates that IBM will shortly introduce two new members of the 360 family of processors. These units will be designed to serve customers who want to handle both batch processing and interactive time-sharing operations on a small- to medium-scale computer.

Currently called as the models 46 and 56, these units will offer processor performance comparable to the models 40 and 50, respectively. The distinguishing feature of the new models will be expanded memory capacity, and advanced memory management features to allow dynamic allocation of storage, segment-by-segment program and data swapping, and memory protection in time-shared operations.

The decision to develop these computer models was based on detailed market studies made by IBM that indicated current computer users desire to move into time-shared, or interactive computer operations on a step-by-step basis, using a handful of terminals initially for key technical and management personnel. These early users will explore potential applications, define data bank requirements, develop data banks, create macro-instructions and special routines for specific applications, and document the system for other users.

Few users have the budget, experience, or the trained technical personnel to begin to use effectively a time-sharing system the size of the 360/67, GE's 625 or 635, or Control Data's 6000 series...systems whose monthly rentals are often quoted in the $100,000's. The 46, renting in minimum configurations for as low as $15,000 a month, will allow a customer to get his feet wet in using a computer on a time-shared basis while continuing to process his regular applications on a computer system priced within his budget.

The competitive impact of the 46 and 56 will be felt primarily by Control Data and GE. Control Data has been successfully selling its 3300 and 3500 systems as medium-scale computers designed for use on a time-shared basis. GE is expected to introduce a 605 and 615 as small- and medium-scale members of its 600 series, which has captured key time-sharing orders at M.I.T., Bell Labs and elsewhere.

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The development of the 46 and 56 also provides an insight into the direction that time-shared computer use will take. Many experts in the field are predicting that a significant share of computer use in the '70's will be through "computer utilities", large centralized computer installations which will simultaneously serve hundreds or even thousands of users located at remote terminals. An alternative view, and one that seems more probable to us, is that a "memory utility" will develop, rather than a "computer utility". This memory utility will be a centralized, multi-billion bit bank of storage containing math tables, compilers for special languages, library routines, scientific and technical documentation, etc...information of common interest to users of computers with a compatible data format. (We expect most computers to be data compatible by 1975.) The peripheral equipment and the processor of the time-shared computer will be located at the working site. The computer can access the central memory bank through data communications lines, when appropriate, transferring in short bursts blocks of information from the central bank to its local mass storage facility. This form of computer use sharply reduces the use, and therefore the cost, of common-carrier data communication lines...the cost of which is a major obstacle to achieving economical remote interactive data processing. Often the monthly long-distance line charges in a remote access computer application equals or exceeds the monthly rental of the computer itself.

The introduction of medium-scale computers such as the 360/46 and 56 designed to handle effectively a limited number of users solving problems on the machine on a time-shared basis makes this concept of "local computer/remote mass memory" computer use seem even more probable. The expected introduction of trillion bit semi-permanent memories using photographic, photochromic, and/or thermoplastic techniques in the next couple of years should carry this concept another giant step toward reality.

HONEYWELL + 3C = REJUVENATED COMPETITOR IN INDUSTRIAL CONTROL SYSTEMS MARKET

The announcement made by Honeywell late last month of plans to acquire Computer Control took the industry by surprise. At first glance the acquisition plans seemed out of step with Honeywell's growing EDP business. However, a closer look at the reasons behind the intended acquisition reveals a move that may well strengthen Honeywell's position in both the EDP and the industrial automation market.

3C has enjoyed a steadily rising sales picture in the past seven years, growing from an estimated $3 million in 1959 to over $24 million in fiscal 1965. In the early days 3C produced primarily digital modules, subassemblies and memories. In mid-'63, 3C delivered its first production computer, the DDP-24; deliveries of 3C's current mainstays, the DDP-224 and DDP-115, began in early 1965. These models are fast, low-cost processors oriented toward the scientific computer and special systems market. Since 1963, approximately 150 systems have been installed, with another 75 on order, indicating that 3C has achieved relative success in this highly competitive market.

However, the production of capable central processors at competitive prices does not necessarily spell success for a company in the third generation computer market. Scientific and system computers are being applied in increasingly sophisticated applications. This means that the manufacturer is required to make large investments in software and service support. 3C is likely to be

hard pressed to find the financial resources and the manpower necessary to keep up with this demand. The association with Honeywell will substantially strengthen 3C's position where it is weakest: extensive array of peripheral equipment, availability of software support and world-wide marketing organization.

For Honeywell the move means the acquisition of a talented, efficient, and cost-conscious engineering organization, and a product line oriented toward a market for computer systems where Honeywell has not succeeded in making any significant inroads: the low-cost scientific, special purpose and military market. Also, 3C's DDP-116 processor offers attractive price/performance features as a data communications controller, a peripheral unit that is playing a key role in time-sharing and advanced management information systems.

Geography offers two additional advantages. Many of 3C's sales offices are located in areas where Honeywell is not yet represented. Also, 3C's plant is only fifteen minutes from the headquarters of Honeywell's EDP Division. . . thus allowing a potentially close blending of management and technical talents. One of the reasons for the disappointing degree of cooperation and collaboration that has existed between Honeywell's EDP computer group and its process control computer group in Fort Washington, Pa., has been the physical distance between the two operations.

The terms of the acquisition call for an exchange of one share of Honeywell's common stock for 3 1/2 shares of 3C's, making the transaction worth approximately $28 million. If the acquisition is put through, 3C will become the Computer Control and Components Division of Honeywell, with 3C President Benjamin Kessel staying on as General Manager. Honeywell's EDP Division and the 3C Division will become the two elements of a new Computer Group within Honeywell. Walter Finke, currently president of Honeywell EDP, will head the new Group; C. W. Spangle will direct the EDP Division.

From the corporate viewpoint, the move should significantly strengthen Honeywell's position in the industrial process control systems business. The market for such advanced systems, while still in its infancy, is expected to grow rapidly in the remaining years of this decade. With central processors provided by 3C, peripheral equipment from Honeywell EDP, and special purpose process control instruments and general control systems know-how provided by Honeywell's Industrial Products Division, the company will have a formidable combination of assets for effective competition in this market.

UNIVAC HAS FIRST OF A FAMILY OF DATA COMMUNICATIONS TERMINALS

Univac recently announced what it calls the first of a new line of data communications terminals, the DCT-2000. The device is a medium-speed communications terminal incorporating a control unit with operator's console, a card reader and punch, and an 80-print position line printer. Rated speeds are 200 cards per minute for the card reader, 75 cards per minute for the card punch, and 250 lines per minute for the printer. The terminal may send and receive information via voice grade communications lines at 300 characters per second. The basic unit rents for $650 per month and the purchase price is $24,000. First deliveries are scheduled for early 1967.

Surprisingly absent from the data communications terminal is a keyboard or some other direct means of inputting alphanumeric information. The only way of

entering information in the system is via the card reader. This design feature of the DCT-2000 indicates that the terminal is intended to be a remote card processing and printing device for applications where a considerable amount of printing is required, and where on-line inquiry requests are infrequent.

As such, the DCT-2000 will not compete directly with other popular data communications terminals, such as the IBM 1050 and Honeywell's Data Station. These communications terminals send, receive, read and print information at a slower speed than the new Univac unit; however, they offer keyboard entry facilities and paper tape equipment in addition to printers, card readers and punches. Moreover, the price of the IBM and Honeywell terminals is significantly below that of the new Univac unit.

Since both the performance and the price of the DCT-2000 is in a different "ball park" from that of other available data communications terminals, the question arises what markets and application areas does Univac plan to cover with the new terminal? It is the only terminal device that offers computer compatible printing speeds at moderate costs, thus it would not be surprising if a considerable portion of current Univac medium- and large-scale computer customers would find the unit quite attractive to serve as remote terminals in computer communications systems. In fact, it may well replace many Univac 1004's currently serving in this capacity. However, the DCT-2000 will make the price/performance of computer communication systems built around Univac's 490 and 1107 series computers more attractive.

To illustrate the place of the new device in the price-performance spectrum of currently available communications terminals, a comparison is made in the table below among the aforementioned devices:

Manufacturer/Model	Control Unit	Keyboard	Card Reader	Card Punch	Printer	Typical Rental
IBM - 1050	Yes	Yes	14.8 ch/s	14.8 ch/s	14.8 ch/s	$ 235
HONEYWELL - Data Station	Yes	Yes	120 ch/s	No	40 lpm	430
UNIVAC DCT-2000	Yes	No	200 cpm	75 cpm	250 lpm	650
UNIVAC - 1004	Yes	No	300 cpm	200 cpm	300 lpm	1,450

In order to cover the data communication terminal requirements of small, medium and large-scale real-time systems, Univac will need to introduce additional DCT units with more flexible input capability and at lower price levels. It is thus with increasing expectations that the industry looks forward to other members of the "complete family" of data communications terminals Univac promises "in the near future".

SDS REDUCES RATES ON LONG-TERM LEASES; AMORTIZES MARKETING EXPENSE ON LEASED EQUIPMENT

SDS has taken two steps to strengthen its financial position in the face of an increasing percentage of its equipment being installed on a leased basis.

In the first move SDS is offering rate reductions ranging from 5 to 30 per cent on long-term leases for its entire line of computers and peripheral equipment. Under terms of the new arrangement, users signing fixed-term leases of up to six years will receive reductions from the standard monthly lease fee. The standard monthly rate is based on a four year lease agreement, which is cancellable after one year.

Under the new SDS plan, monthly rental on new installations for a four year fixed term will be approximately 90 percent of the standard lease; for a five year term, 85 percent; and for a six year term, 80 percent. For customers converting existing leases into fixed term agreements, SDS is also offering a special conversion plan which provides rate reductions of up to 30 percent if a new agreement is signed before July 1, 1966. Conversion plan leases may run from two to six years.

SDS has made arrangements to sell off the increased number of long-term lease contracts to financial houses to acquire immediate income. The SDS plan follows closely a similar step taken recently by Honeywell after offering incentives to customers taking long-term leases.

SDS has also announced that effective January 1, 1966 it has changed its method of accounting to amortize over three years a proportionate share of marketing expense directly related to the acquisition of leased orders. Expenses incurred in product development, software development costs, and marketing expenses related to outright sales will continue to be written off as occurred. This move follows closely Control Data's decision last year to amortize its marketing expenses on leased orders over a similar period.

SDS had a 36% sales growth in the first quarter of 1966, to $12,017,000 from $8,833,000 in the corresponding period last year. Net income after taxes rose to $849,000, or 37¢ per share, from $635,000 or 30¢ per share. Had this change in accounting method been in effect in 1965, net income after taxes for the first quarter of 1965 would have been increased by $115,000, or 5¢ per share.

Editor's Scratchpad

GE has joined the growing fraternity of computer builders offering discounts to purchasers of their equipment. The GE deal is on its line of GE/PAC 4000 line of process control computers. The purchaser gets a 7 1/2% discount from the list price if he acts within six months of installation. GE has also issued separate price schedules on its process computer equipment for programming, systems engineering, and maintenance.

Control Data gets a break on its 6000 series. NYU's Courant Institute and the Weather Bureau have accepted their systems. Aerospace Corp., frustrated by delays in delivery of its 360/65, orders a 6600 for delivery next month. Socony Mobil orders a 6600 for its research center in Texas. Knowles and Bettis Atomic Power Stations stick to their plans to acquire 6600's. Universities of Texas and Minnesota order 6600's. Texas will get theirs in July; Minnesota, in September. With twelve 6600's installed now, and over 8 on order it looks like CDC is finally beginning to see some sunshine through the clouds of uncertain performance created by the early installations of this super-scale computer.

MONTHLY COMPUTER CENSUS

The number of electronic digital computers installed or in production at any one time has been increasing at a bewildering pace in the past several years. New vendors have come into the market, and familiar machines have gone out of production. Some machines have been received with open arms by users -- others have been given the cold shoulder.

To aid readers of the EDP I&MR in keeping with this mushrooming activity, we compile and publish this monthly report on the number of general purpose electronic computers made by American-based companies which are installed or on order as of the preceding month. These figures included installations and orders outside the United States. We update this computer census monthly, so that it will serve as a "box score" of progress in following the growth of the American computer industry, and of the computing power it builds.

In general, manufacturers in the computer field do not officially release installation and on order figures. The figures in this table are developed through a continuing market survey conducted by our research staff. This market research program develops a documented data file on over 80% of the computer installations in the United States. A similar program is conducted for overseas installations.

Comments on this census from informed readers will be welcomed.

AS OF MARCH 10, 1966

NAME OF MANUFACTURER	NAME OF COMPUTER	SOLID STATE?	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS	NUMBER OF UNFILLED ORDERS
Advanced Scientific Instruments	ASI 210	Y	$3850	4/62	24	0
	ASI 2100	Y	$4200	12/63	7	1
	ADVANCE 6020	Y	$4400	4/65	7	6
	ADVANCE 6040	Y	$5600	7/65	3	6
	ADVANCE 6050	Y	$9000	2/66	1	4
	ADVANCE 6070	Y	$15,000	10/65	1	6
	ADVANCE 6080	Y	$13,000	4/66	0	0
Autonetics	RECOMP II	Y	$2495	11/58	45	X
	RECOMP III	Y	$1495	6/61	10	X
Bunker-Ramo Corp.	BR-130	Y	$2000	10/61	159	5
	BR-133	Y	$2400	5/64	19	4
	BR-230	Y	$2680	8/63	15	X
	BR-300	Y	$3000	3/59	37	X
	BR-330	Y	$4000	12/60	34	X
	BR-340	Y	$7000	12/63	20	X
Burroughs	205	N	$4600	1/54	50	X
	220	N	$14,000	10/58	41	X
	E101-103	N	$875	1/56	145	X
	B100	Y	$2800	8/64	125	16
	B250	Y	$4200	11/61	95	4
	B260	Y	$3750	11/62	225	10
	B270	Y	$7000	7/62	148	12
	B280	Y	$6500	7/62	120	16
	B300	Y	$8400	7/65	68	90
	B5500	Y	$20,000	3/63	49	10
	B8500	Y	$200,000	2/67	0	1
Clary	DE-60/DE-60M	Y	$525	7/60	355	4
Computer Control Co.	DDP-24	Y	$2500	5/63	70	8
	DDP-116	Y	$900	4/65	45	48
	DDP-124	Y	$2050	3/66	2	12
	DDP-224	Y	$3300	3/65	20	22
Control Data Corporation	G-15	N	$1600	7/55	310	X
	G-20	Y	$15,500	4/61	23	X
	LGP-21	Y	$725	12/62	98	X
	LGP-30	semi	$1300	9/56	295	X
	RPC-4000	Y	$1875	1/61	50	X
	160*/160A/160G	Y	$1750/$3400/$12,000	5/60;7/61;3/64	450	1
	924/924A	Y	$11,000	8/61	30	X
	1604/1604A	Y	$45,000	1/60	58	X
	1700	Y	$2200	5/66	0	60
	3100	Y	$7350	12/64	63	32
	3200	Y	$12,000	5/64	97	10
	3300	Y	$15,000	9/65	4	35
	3400	Y	$25,000	11/64	19	6
	3500	Y	$30,000	9/66	0	4
	3600	Y	$58,000	6/63	50	10
	3800	Y	$60,000	2/66	1	16
	6400	Y	$40,000	3/66	0	11
	6600	Y	$110,000	8/64	9	7
	6800	Y	$140,000	4/67	0	2
Data Machines, Inc.	620	Y	$900	11/65	6	32
Digital Equipment Corp.	PDP-1	Y	$3400	11/60	60	X
	PDP-4	Y	$1700	8/62	55	2
	PDP-5	Y	$900	9/63	112	1
	PDP-6	Y	$10,000	10/64	14	7
	PDP-7	Y	$1300	11/64	54	48
	PDP-8	Y	$525	4/65	180	275
El-tronics, Inc.	ALWAC IIIE	N	$1820	2/54	21	X
Electronic Associates, Inc.	8400	Y	$7000	6/65	4	6
Friden	6010	Y	$600	6/63	540	85
General Electric	115	Y	$1375	12/65	30	420
	205	Y	$2900	6/64	44	8
	210	Y	$16,000	7/59	50	X
	215	Y	$6000	9/63	55	2
	225	Y	$8000	4/61	155	10
	235	Y	$10,900	4/64	60	8
	415	Y	$7300	5/64	100	65
	425	Y	$9600	6/64	54	40
	435	Y	$14,000	10/64	22	18
	625	Y	$14,000	12/64	12	26
	635/645	Y	$45,000	12/64	5	28
Honeywell Electronic Data Processing	H-120	Y	$2600	1/66	25	290
	H-200	Y	$5700	3/64	620	110
	H-400	Y	$8500	12/61	122	5
	H-800	Y	$22,000	12/60	86	3
	H-1200	Y	$6500	2/66	1	42
	H-1400	Y	$14,000	1/64	12	1

NAME OF MANUFACTURER	NAME OF COMPUTER	SOLID STATE?	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS	NUMBER OF UNFILLED ORDERS
Honeywell (cont'd)	H-1800	Y	$30,000	1/64	17	6
	H-2200	Y	$11,000	1/66	2	44
	H-4200	Y	$16,800	3/66	0	8
	H-8200	Y	$35,000	3/67	0	3
	DATAmatic 1000	N	$40,000	12/57	4	X
IBM	305	N	$3600	12/57	165	X
	360/20	Y	$1800	12/65	45	4100
	360/30	Y	$7500	5/65	800	3200
	360/40	Y	$15,000	4/65	525	1000
	360/44	Y	$10,000	9/66	0	380
	360/50	Y	$26,000	8/65	25	360
	360/62	Y	$55,000	11/65	1	X
	360/65	Y	$50,000	11/65	2	110
	360/67	Y	$54,000	9/66	0	50
	360/75	Y	$78,000	2/66	1	55
	360/90 Series	Y	$140,000	6/67	0	8
	650	N	$4800	11/54	240	X
	1130	Y	$1000	11/65	50	2000
	1401	Y	$6000	9/60	6650	250
	1401-G	Y	$1900	5/64	1325	60
	1410	Y	$14,200	11/61	745	40
	1440	Y	$3300	4/63	2850	220
	1460	Y	$9000	10/63	2000	150
	1620 I, II	Y	$2500	9/60	1700	30
	1800	Y	$3700	1/66	1	150
	701	N	$5000	4/53	1	X
	7010	Y	$22,600	10/63	185	25
	702	N	$6900	2/55	8	X
	7030	Y	$160,000	5/61	7	X
	704	N	$32,000	12/55	37	X
	7040	Y	$18,000	6/63	118	8
	7044	Y	$35,200	6/63	122	20
	705	N	$30,000	11/55	60	X
	7070, 2, 4	Y	$27,000	3/60	335	5
	7080	Y	$55,000	8/61	80	X
	709	N	$40,000	8/58	11	X
	7090	Y	$63,500	11/59	45	1
	7094	Y	$72,500	9/62	130	5
	7094 II	Y	$78,500	4/64	115	15
ITT	7300 ADX	Y	$18,000	9/61	9	6
Monroe Calculating Machine Co.	Monrobot IX	N	Sold only - $5800	3/58	150	X
	Monrobot XI	Y	$700	12/60	580	100
National Cash Register Co.	NCR - 304	Y	$14,000	1/60	26	X
	NCR - 310	Y	$2000	5/61	20	X
	NCR - 315	Y	$8500	5/62	385	50
	NCR - 315-RMC	Y	$12,000	9/65	10	25
	NCR - 390	Y	$1850	5/61	1070	35
	NCR - 500	Y	$1500	10/65	180	800
Philco	1000	Y	$7010	6/63	20	0
	2000-210, 211	Y	$40,000	10/58	18	1
	2000-212	Y	$52,000	1/63	11	1
Radio Corporation of America	Bizmac	N	$100,000	-/56	3	X
	RCA 301	Y	$6000	2/61	645	5
	RCA 3301	Y	$11,500	7/64	47	16
	RCA 501	Y	$14,000	6/59	99	2
	RCA 601	Y	$35,000	11/62	5	X
	Spectra 70/15	Y	$2600	11/65	15	90
	Spectra 70/25	Y	$5000	11/65	7	55
	Spectra 70/35	Y	$7000	4/66	0	45
	Spectra 70/45	Y	$9000	11/65	3	125
	Spectra 70/55	Y	$14,000	5/66	0	12
Raytheon	250	Y	$1200	12/60	172	2
	440	Y	$3500	3/64	14	3
	520	Y	$3200	10/65	5	5
Scientific Control Systems	650	Y	$500	3/65	0	2
	660	Y	$2000	10/65	2	1
	670	Y	$2600	3/65	0	2
Scientific Data Systems, Inc.	SDS-92	Y	$775	4/65	35	45
	SDS-910	Y	$2000	8/62	167	13
	SDS-920	Y	$2700	9/62	112	10
	SDS-925	Y	$2500	12/64	15	33
	SDS-930	Y	$4000	6/64	84	30
	SDS-9300	Y	$7000	11/64	20	9
Systems Engineering Labs	SEL-810	Y	$750	9/65	4	13
	SEL-840	Y	$4000	11/65	2	3
UNIVAC	I & II	N	$25,000	3/51 & 11/57	30	X
	III	Y	$20,000	8/62	84	1
	File Computers	N	$15,000	8/56	18	X
	Solid-State 80 I, II, 90 I, II & Step	Y	$8000	8/58	275	X
	418	Y	$11,000	6/63	62	28
	490 Series	Y	$35,000	12/61	88	60
	1004	Y	$1900	2/63	3300	160
	1005	Y	$2400	3/66	0	155
	1050	Y	$8000	9/63	285	80
	1100 Series (except 1107)	N	$35,000	12/50	12	X
	1107	Y	$60,000	10/62	30	2
	1108	Y	$65,000	9/65	7	22
	LARC	Y	$135,000	5/60	2	X
				TOTALS	32,526	16,361

X = no longer in production

* To avoid double counting, note that the Control Data 160 serves as the central processor of the NCR 310. Also, many of the orders for the IBM 7044, 7074, and 7094 I and II's are not for new machines but for conversion from existing 7040, 7070, and 7090 computers respectively.

STOCK MARKET REPORT ON SELECTED EDP FIRMS

April 8, 1966 - April 22, 1966

	1966 High	1966 Low	2 weeks Sales in 100's	2 weeks High	2 weeks Low	Last	2 weeks Net Change	2 weeks % Change
NEW YORK STOCK EXCHANGE								
Addressograph-Multigraph	77 3/8	54 1/8	1413	77 3/8	71	75 1/2	+5/8	+0.83
American R & D	30 3/8	20 1/4	379	30 3/8	25 7/8	30 1/8	+2 1/2	+9.05
Ampex Corp.	26 3/4	19 5/8	3417	23 1/4	21 1/2	22 1/8	-3/8	-1.67
Burroughs	70 7/8	49 1/4	1969	70 7/8	65 1/2	67 7/8	-7/8	-1.27
Control Data	38 1/4	26 3/8	4755	32	28 3/4	30	+1 3/8	+4.80
Dura Corp.	33 1/4	25	167	32 3/4	31 1/8	32	-3/4	-2.29
Electronic Assoc.	27 1/8	20 1/8	1020	23 7/8	20 1/4	20 7/8	-1 5/8	-7.22
General Dynamics	66 1/2	51 1/2	4951	66 1/2	59 1/2	64 5/8	+3 1/4	+5.30
General Electric	120	106 1/8	1930	118 5/8	108 1/8	117 1/2	+8 3/8	+7.67
Honeywell	96	68 1/2	1682	96	83 1/8	84 1/4	-9 1/4	-9.89
IBM	562	472	712	562	533	555	+15	+2.78
Inter. Tel & Tel	77 1/2	65 3/4	1480	77 1/2	73 3/8	76 3/8	+3 1/8	+4.27
Litton	86 1/2	66 1/2	1554	84 3/4	79 1/2	80 3/4	-3	-3.58
Nat. Cash Register	91 1/2	76	805	91 1/4	87 1/4	89 1/2	-7/8	-0.97
RCA	62 1/4	46 1/8	6090	62 1/4	55 7/8	59 5/8	+3 1/2	+6.24
Raytheon	55 1/8	36	6202	55 1/8	50	51 1/4	+1	+1.99
SCM	84 1/4	47 1/4	11,129	84 1/4	67 7/8	80	+9 7/8	+14.08
Singer	64 3/4	55	966	61 3/4	56 1/2	61	+5 5/8	+10.16
Sperry Rand	24 3/4	17 1/8	16,520	24 3/4	20 1/4	24 3/4	+3 7/8	+18.56
NYSE COMPUTER STOCK AVERAGE							+2.18	+3.10
AMERICAN STOCK EXCHANGE								
ANelex	28	20 1/2	265	25 1/2	23 1/2	23 1/2	-3/8	-1.57
Bunker-Ramo	10 1/8	7 1/4	1589	10 1/8	8 5/8	9 5/8	+3/8	+4.05
Cal Comp	18 3/4	13 1/4	319	18 3/4	17 1/2	18 3/8	+1 3/8	+8.09
Clary	8	4 5/8	1742	8	6 1/2	6 5/8	+1/4	+3.92
Computer Application	26 1/4	19 1/2	535	25 1/8	22 1/8	22 1/2	-1	-4.26
Computer Science	34 7/8	19 1/8	1795	33 3/4	28	28 5/8	+1 1/8	+4.09
Milgo Elect.	8 3/4	6 7/8	164	8 5/8	7 1/8	8 3/8	+1	+13.56
Planning Research	36 1/2	21 1/8	208	25 1/4	21 1/8	23 1/2	-2	-7.83
Potter Instrument	26 3/8	14 5/8	656	26 3/8	21	22 3/4	+1	+4.60
AMEX COMPUTER STOCK AVERAGE							+0.19	+2.74

	1966 High Bid	1966 Low Bid	April 22 Bid	April 22 Asked	2 weeks ago Bid
OVER-THE-COUNTER					
C-E-I-R	15 1/4	10 5/8	10 5/8	11	12 5/8
Computer Usage	23 3/4	17 3/4	23	25 5/8	18 1/2
Computer Control	25 1/2	14	22 1/2	23 1/2	25
Digitronics	12 3/4	8 5/8	10 1/8	10 5/8	11 3/8
Management Assistance	45 3/4	33	42 1/4	42 3/4	36 7/8
Scientific Data	74 1/2	44	65	66	74 1/2

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May 31, 1966 Vol. 2, No. 4

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E|D|P
INDUSTRY AND MARKET REPORT
A SEMI-MONTHLY NEWSLETTER FOR EXECUTIVES IN THE ELECTRONIC DATA PROCESSING INDUSTRY, AND THE FINANCIAL COMMUNITY.

P. J. McGovern, Editor
Telephone 617/332-8840

IBM MAKES SIGNIFICANT DISCLOSURES ON EDP MARKET IN PROSPECTUS; PROVIDES BASIS FOR ESTIMATING VALUE OF 360 BACKLOG AT $5.3 BILLION

Computer market analysts were recently treated to several significant disclosures by IBM on the size and nature of its EDP business. The disclosures were made in the prospectus accompanying the current offering to IBM stockholders of 1,324,136 common shares of IBM at a subscription price of $285/share. . .the net proceeds of the offering to be used principally to finance the manufacture of 360 computer systems for rental to customers.

Probably the most significant disclosure in the prospectus is that on March 31, 1966 IBM had orders on hand for the lease or purchase of data processing machines and systems having a net monthly rental value or equivalent of approximately $78 million, after deducting estimated replacements of installed rental equipment and estimated order cancellations. This $78 million figure represents the net increase in the total monthly rental value of installed IBM data processing equipment when the backlog has been worked off. Using a 50-to-1 purchase to rental price ratio, this backlog represents a potential net increase of $3.9 billion in the sales value of IBM computers installed.

Of greater interest to the industry, however, is the gross value of the computers that will need to be shipped to achieve this $78 million net monthly rental increase. To determine this, we analyzed the distribution of IBM computer orders in our Computer Installation Census File as well as the average net rental increase being achieved by 360 systems replacing installed IBM computer systems. We found:

(1) Approximately one out of every four IBM computer systems on order is going to a new customer or to a new installation site in an existing customer's organization. However, most of these "new installation" systems are small-scale computers. Taken together, they account for approximately 15% of the value of the backlog.

(2) Computer systems on order to replace existing systems have an average net rental value increase of 35% over the rental value of the systems to be replaced. Therefore, 26% of the monthly rental value of the on-order system represents the net monthly increase expected when the new system is installed.

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(3) The upgrading from year to year of the processor and/or peripheral equipment of installed IBM computer systems represents an important part of the annual shipments of IBM, and hence the backlog at any one time. At the current time this type of "add on" equipment represents approximately 16% of the backlog. As when a new computer system replaces an installed one, the net monthly rental increase when "add on" units are installed is equal to approximately 26% of the rental value of the new equipment.

Therefore, the net rental increase is 15% + (26% X 85%) = 37% of the gross rental backlog. Since $78 million is the net monthly rental backlog, the gross monthly rental backlog for IBM is estimated to be $210 million. The gross sales value of the equipment in this backlog is an astonishing $10.5 billion!

The census table below provides our estimate of the distribution of this backlog, by model.

EDP I&MR CENSUS ESTIMATE OF IBM CURRENT ORDER BACKLOG FOR DP EQUIPMENT

		Average Monthly Rental	Number of Units Inst.	Number of Units On Order	Gross Monthly Rental of On Order ($1000's)
IBM	360/20	$ 1800	100	6200	11,160
	360/30	7500	1100	4000	30,000
	360/40	15,000	700	1650	24,750
	360/44	10,000	0	535	5350
	360/50	26,000	40	640	16,640
	360/65	50,000	5	105	5250
	360/67	75,000	0	55	4125
	360/75	78,000	1	45	3510
	360/90 Series	140,000	0	9	1260
	1130	1200	150	3600	4320
	1401	6600	6600	310	2046
	1401-G	1900	1450	60	114
	1410	14,200	750	115	1633
	1440	4800	3000	490	2352
	1460	9000	2000	135	1215
	1620 I, II	4000	1700	50	200
	1800	7600	5	270	2052
	7010	22,600	192	35	791
	7040	22,000	118	14	308
	7044	32,000	125	20	640
	7070, 2, 4	27,000	335	5	135
	7090	63,500	45	1	64
	7094	72,500	126	5	363
	7094 II	78,500	120	12	942
				Subtotal - Computer Systems	$119,220

Other Data Processing Equipment Categories

	Gross Rental Value of On Order ($1,000's)
Data Collection and Data Transmission Terminals	$ 16,000
Special Purpose Data Processing Systems	3,000
Proofing Machines	200
Graphic Data Processing and Image Storage Units	4,800
Unit Record (Tab) Equipment	22,000
Computer Memory and Peripheral Equipment as "Add-on" Shipments	33,600
Miscellaneous DP Equipment	3,000
12xx Series - MICR, OCR, Special Bank Systems	2,200
17xx Series - Process Control Instrumentation	2,700
19xx Series - Special Systems	1,700
6400	1,600
Subtotal Other DP Equipment	$90,800
TOTAL GROSS MONTHLY RENTAL ON ORDER	$210,020

The census above indicates that IBM has just under $6 billion worth of general purpose computers on order. . .$5.3 billion of which is accounted for by models of the 360 line. Since the prospectus states that available delivery dates on new computer orders is approximately 24 months at this time, IBM can be expected to ship most of this $6 billion backlog during the next two years.

Some of the other business disclosures in the prospectus include:

*Rental and sale of electronic and punched card data processing machines and systems accounted for $2.75 billion in 1965, 77% of IBM's total gross income.

*Approximately 20% of all IBM data processing equipment installed and in use worldwide have been purchased outright by customers or their agents. Note: J. R. Opel, IBM Vice President, provided the following rent/purchase breakdown of IBM computer systems as of December 31, 1964, in a letter to Senator Philip A. Hart in connection with the hearings last September on economic concentration before the Subcommittee on Antitrust and Monopoly of the Senate Judiciary Committee:

System Designation	%Rented	%Purchased
Large systems (IBM 7080,7090,7094I,7094II)	57	43
Medium systems (IBM 1410,1460,7010,7040,7066, 7070,7074)	82	18
Small systems (IBM 1401,1440,1620)	85	15

*IBM World Trade Corp., which manufactures and markets IBM products outside the U.S., accounted for 30.4% of IBM's gross revenue in 1965, compared to 22.6% in 1961, and 27.5% in 1963. At the current time it also accounts for 32.9% of the total net property account.

*At the end of 1965, World Trade had more than 60,000 employees in 321 sales offices, 218 service bureaus, 15 manufacturing plants, six development engineering laboratories and other facilities in 102 countries around the world.

*Approximately 85% of the components and machines marketed by IBM World Trade are manufactured outside the U. S.

*IBM employs approximately 55,000 salesmen, systems engineers and customer engineers throughout the world, of which approximately 32,000 are employed by the Corporation in the United States, its territories and possessions.

*The super-scale 360/90 series, a limited production model, has been plagued with production difficulties on its high-speed integrated circuits. This will result in some delivery postponements, as well as an inventory loss estimated at $15 million.

*As of March 31, IBM facilities totaled 21.5 million square feet, of which 16 million were owned and 5.5 million were leased. At that time it had under construction 3.5 million square feet of manufacturing and development facilities scheduled for completion in 1966 or early 1967.

*Capital expenditures, principally for data processing machines, but also for new plants and manufacturing equipment that IBM makes and leases to customers totaled $1.2 billion 1965 and $3.7 billion for all five years ending December 31, 1965. For each of the years 1966 and 1967, IBM expects to "substantially exceed" the expenditures made in 1965.

*As of the end of 1965, IBM had rental machines and parts on hand and in customer locations with a cost value of $3.32 billion. Estimating a cost-to-sales ratio of 28%, this means that IBM had rental machines and parts on hand worth $11.8 billion as of December 1965. This figure includes typewriters, dictating equipment, spare parts, etc., as well as computers, peripheral equipment, and tab gear.

IBM's prospectus is available from the offering underwriters, led by Morgan Stanley & Co., 2 Wall Street, New York, New York.

BURROUGHS SOUPS-UP THE B5500 WITH THIN-FILM MEMORY AND INTEGRATED CIRCUITS TO CREATE NEW B6500 PROCESSOR

Burroughs Corp. introduced its much rumored B6500 system this past week. The announcement is likely not only to reassure existing B5500 customers that their programming expenses can be reinvested in a newer and faster processor, but also to unease the competition with the prospect of facing a computer system combining the most modern componentry with a software package field tested for over three years.

The B6500 uses the same logic organization as, and is program compatible with, the B5500. It uses monolithic integrated circuits and a planar thin-film memory with a .6 usec. cycle time to achieve a processor performance improvement of five times over the B5500. . .at about a 50% increase in cost. In addition, main memory size (limited to 32K in the B5500) is expandable up to 106K 48-bit words. I/O capability has also been doubled by use of a multiplexer that allows up to eight I/O operations to occur simultaneously.

The B6500 is the newest member of Burroughs' B500 "family" of computers. The position of the B6500 in the B500 group is shown in the table below:

Model	Decimal? Binary?	Av. Monthly Rental	Date of Intro.	Date of first Installation	No. of Instls.	Est. No. of Unfilled Orders
B2500	D	$5,000	3/66	1/67	0	22
B3500	D	$14,000	3/66	5/67	0	18
B5500	B	$20,000	9/64	10/64	50	15
B6500	B	$33,000	6/66	2/68	0	2
B8500	B	$200,000	8/65	2/67	0	1
					50	58

Surprisingly, twenty months are to pass before the first B6500 is to be delivered. . .an announcement-to-delivery delay longer than that of any other system in its price class in the history of the computer industry! . . . and effecting an admirable strategy for preserving the longevity of B5500 rental income. New customers for the B6500 should have ample time to debug their programs on a B5500 before their new system arrives.

Acceptance of the B6500 by new customers as well as by current B5500 users will depend to a large extent upon the degree to which the hardware and software of the B5500 has satisfied the needs of its current customers. To assess the potential of this market acceptance, we conducted an informal survey of current B5500 users this past week. Here's what we found:

Q. 1: How do you rate the performance of your B5500 hardware?

Users uniformly were very satisfied; special praise was heaped upon the Burroughs "head-per-track" disk file.

Q. 2: How do you rate the B5500 software and programming support?

Users were quite pleased with it, with one user swearing it was "the best in the industry".

Q. 3: How do you rate the maintenance support for the B5500?

Comments ranged from "excellent" to "competitive", with one user giving Burroughs highest grades in preventive maintenance.

Q. 4: How do you rate the customer training program for the B5500?

Here users were less enthusiastic, saying it was "about average" to "outclassed by IBM's full-bodied productions".

Q. 5: What is your overall evaluation of the performance of the B5500?

Users were quite happy with the productivity of their B5500. One user was ordering three more; another, one more. Main complaint was the 32K limitation on the size of the main memory size. . . users would like to double it. Use of the B300 as a satellite was also cited as affording a boost in productivity.

(continued on last page)

MONTHLY COMPUTER CENSUS

The number of electronic digital computers installed or in production at any one time has been increasing at a bewildering pace in the past several years. New vendors have come into the market, and familiar machines have gone out of production. Some machines have been received with open arms by users -- others have been given the cold shoulder.

To aid readers of the EDP I&MR in keeping with this mushrooming activity, we compile and publish this monthly report on the number of general purpose electronic computers made by American-based companies which are installed or on order as of the preceding month. These figures included installations and orders outside the United States. We update this computer census monthly, so that it will serve as a "box score" of progress in following the growth of the American computer industry, and of the computing power it builds.

In general, manufacturers in the computer field do not officially release installation and on order figures. The figures in this table are developed through a continuing market survey conducted by our research staff. This market research program develops a documented data file on over 80% of the computer installations in the United States. A similar program is conducted for overseas installations.

Comments on this census from informed readers will be welcomed.

AS OF APRIL 10, 1966

NAME OF MANUFACTURER	NAME OF COMPUTER	SOLID STATE?	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS	NUMBER OF UNFILLED ORDERS
Advanced Scientific Instruments	ASI 210	Y	$3850	4/62	24	0
	ASI 2100	Y	$4200	12/63	7	1
	ADVANCE 6020	Y	$4400	4/65	8	6
	ADVANCE 6040	Y	$5600	7/65	3	6
	ADVANCE 6050	Y	$9000	2/66	1	4
	ADVANCE 6070	Y	$15,000	10/65	2	6
	ADVANCE 6080	Y	$13,000	4/66	0	0
Autonetics	RECOMP II	Y	$2495	11/58	44	X
	RECOMP III	Y	$1495	6/61	10	X
Bunker-Ramo Corp.	BR-130	Y	$2000	10/61	159	5
	BR-133	Y	$2400	5/64	19	4
	BR-230	Y	$2680	8/63	15	X
	BR-300	Y	$3000	3/59	37	X
	BR-330	Y	$4000	12/60	34	X
	BR-340	Y	$7000	12/63	20	X
Burroughs	205	N	$4600	1/54	49	X
	220	N	$14,000	10/58	40	X
	E101-103	N	$875	1/56	145	X
	B100	Y	$2800	8/64	135	15
	B250	Y	$4200	11/61	95	4
	B260	Y	$3750	11/62	227	8
	B270	Y	$7000	7/62	148	12
	B280	Y	$6500	7/62	122	16
	B300	Y	$8400	7/65	72	85
	B2500	Y	$5000	1/67	0	22
	B3500	Y	$14,000	5/67	0	18
	B5500	Y	$20,000	3/63	50	10
	B8500	Y	$200,000	2/67	0	1
Clary	DE-60/DE-60M	Y	$525	7/60	355	4
Computer Control Co.	DDP-24	Y	$2500	5/63	70	8
	DDP-116	Y	$900	4/65	50	30
	DDP-124	Y	$2050	3/66	12	18
	DDP-224	Y	$3300	3/65	22	22
Control Data Corporation	G-15	N	$1600	7/55	310	X
	G-20	Y	$15,500	4/61	23	X
	LGP-21	Y	$725	12/62	125	X
	LGP-30	semi	$1300	9/56	120	X
	RPC-4000	Y	$1875	1/61	55	X
	160*/160A/160G	Y	$1750/$3400/$12,000	5/60;7/61;3/64	450	5
	924/924A	Y	$11,000	8/61	29	X
	1604/1604A	Y	$45,000	1/60	58	X
	1700	Y	$4000	5/66	0	38
	3100	Y	$7350	12/64	66	33
	3200	Y	$12,000	5/64	90	X
	3300	Y	$15,000	9/65	6	32
	3400	Y	$25,000	11/64	20	1
	3500	Y	$30,000	9/66	0	5
	3600	Y	$58,000	6/63	50	3
	3800	Y	$60,000	2/66	1	8
	6400	Y	$40,000	5/66	0	11
	6600	Y	$110,000	8/64	10	8
	6800	Y	$140,000	4/67	0	5
Data Machines, Inc.	620	Y	$900	11/65	6	32
Digital Equipment Corp.	PDP-1	Y	$3400	11/60	60	X
	PDP-4	Y	$1700	8/62	55	2
	PDP-5	Y	$900	9/63	112	1
	PDP-6	Y	$10,000	10/64	17	6
	PDP-7	Y	$1300	11/64	59	45
	PDP-8	Y	$525	4/65	210	280
El-tronics, Inc.	ALWAC IIIE	N	$1820	2/54	21	X
Electronic Associates, Inc.	8400	Y	$7000	6/65	4	6
Friden	6010	Y	$600	6/63	400	85
General Electric	115	Y	$1375	12/65	45	420
	205	Y	$2900	6/64	45	7
	210	Y	$16,000	7/59	50	X
	215	Y	$6000	9/63	56	X
	225	Y	$8000	4/61	215	X
	235	Y	$10,900	4/64	62	2
	415	Y	$7300	5/64	145	66
	425	Y	$9600	6/64	56	42
	435	Y	$14,000	10/64	24	18
	625	Y	$45,000	12/64	13	26
	635/645	Y	$55,000	12/64	7	30
Honeywell Electronic Data Processing	H-120	Y	$2600	1/66	40	300
	H-200	Y	$5700	3/64	675	95
	H-400	Y	$8500	12/61	122	5
	H-800	Y	$22,000	12/60	86	3
	H-1200	Y	$6500	2/66	3	42

NAME OF MANUFACTURER	NAME OF COMPUTER	SOLID STATE?	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS	NUMBER OF UNFILLED ORDERS
Honeywell (cont'd)	H-1400	Y	$14,000	1/64	12	1
	H-1800	Y	$30,000	1/64	18	6
	H-2200	Y	$11,000	1/66	4	45
	H-4200	Y	$16,800	6/66	4	8
	H-8200	Y	$35,000	3/67	0	3
	DATAmatic 1000	N	$40,000	12/57	4	X
IBM	304	N	$3600	12/57	164	X
	360/30	Y	$1800	12/65	100	6200
	360/30	Y	$7500	5/65	1100	4100
	360/40	Y	$15,000	4/65	700	1650
	360/44	Y	$10,000	9/66	0	535
	360/50	Y	$26,000	8/65	40	640
	360/62	Y	$55,000	11/65	1	X
	360/65	Y	$50,000	11/65	5	105
	360/67	Y	$75,000	9/66	0	55
	360/75	Y	$78,000	2/66	3	45
	360/90 Series	Y	$140,000	6/67	0	9
	650	N	$4800	11/54	235	X
	1130	Y	$1200	11/65	150	3600
	1401	Y	$6600	9/60	6600	310
	1401-G	Y	$1900	5/64	1450	60
	1410	Y	$14,200	11/61	750	115
	1440	Y	$4800	4/63	3000	490
	1460	Y	$9000	10/63	2000	135
	1620 I, II	Y	$4000	9/60	1700	50
	1800	Y	$7600	1/66	5	270
	701	N	$5000	4/53	1	X
	7010	Y	$22,600	10/63	192	35
	702	N	$6900	2/55	8	X
	7030	Y	$160,000	5/61	6	X
	704	N	$32,000	12/55	37	X
	7040	Y	$22,000	6/63	118	14
	7044	Y	$32,000	6/63	125	20
	705	N	$38,000	11/55	60	X
	7070, 2, 4	Y	$27,000	3/60	335	5
	7080	Y	$55,000	8/61	80	X
	709	N	$40,000	8/58	11	X
	7090	Y	$63,500	11/59	45	1
	7094	Y	$72,500	9/62	126	5
	7094 II	Y	$78,500	4/64	120	12
Monroe Calculating Machine Co.	Monrobot IX	N	Sold only - $5800	3/58	145	X
	Monrobot XI	Y	$700	12/60	480	100
National Cash Register Co.	NCR - 304	Y	$14,000	1/60	26	X
	NCR - 310	Y	$2000	5/61	20	X
	NCR - 315	Y	$8500	5/62	388	45
	NCR - 315-RMC	Y	$12,000	9/65	13	25
	NCR - 390	Y	$1850	5/61	1100	35
	NCR - 500	Y	$1500	10/65	250	850
Philco	1000	Y	$7010	6/63	20	X
	2000-210, 211	Y	$40,000	10/58	18	X
	2000-212	Y	$52,000	1/63	11	X
Radio Corporation of America	Bizmac	N	$100,000	-/56	2	X
	RCA 301	Y	$7000	2/61	645	5
	RCA 3301	Y	$17,000	7/64	50	14
	RCA 501	Y	$14,000	6/59	99	2
	RCA 601	Y	$35,000	11/62	5	X
	Spectra 70/15	Y	$3500	9/65	23	95
	Spectra 70/25	Y	$5000	9/65	12	60
	Spectra 70/35	Y	$9000	4/66	0	60
	Spectra 70/45	Y	$15,000	11/65	5	125
	Spectra 70/55	Y	$30,000	7/66	0	12
Raytheon	250	Y	$1200	12/60	172	2
	440	Y	$3500	3/64	14	3
	520	Y	$3200	10/65	8	7
Scientific Control Systems	650	Y	$500	4/66	0	3
	660	Y	$2000	10/65	3	2
	670	Y	$2600	4/66	0	2
Scientific Data Systems Inc.	SDS-92	Y	$1100	4/65	39	44
	SDS-910	Y	$2000	8/62	172	13
	SDS-920	Y	$2900	9/62	116	10
	SDS-925	Y	$3000	12/64	15	22
	SDS-930/940	Y	$940	6/64	110	30
	SDS-9300	Y	$7000	11/64	25	10
	Sigma 7	Y	$10,000	12/66	0	14
Systems Engineering Labs	SEL-810	Y	$750	9/65	5	13
	SEL-840	Y	$4000	11/65	3	3
UNIVAC	I & II	N	$25,000	3/51 & 11/57	29	X
	III	Y	$20,000	8/62	83	1
	File Computers	N	$15,000	8/56	18	X
	Solid-State 80I, II, 90 I, II & Step	Y	$8000	8/58	275	X
	418	Y	$11,000	6/63	70	38
	490 Series	Y	$35,000	12/61	90	62
	1004	Y	$1900	2/63	3350	160
	1005	Y	$2400	3/66	0	155
	1050	Y	$8000	9/63	290	70
	1100 Series (except 1107)	N	$35,000	12/50	12	X
	1107	Y	$60,000	10/62	30	2
	1108	Y	$65,000	9/65	7	16
	LARC	Y	$135,000	5/60	2	X
				TOTALS	33,523	22,496

X = no longer in production.

* To avoid double counting, note that the Control Data 160 serves as the central processor of the NCR 310. Also, many of the orders for the IBM 7044, 7074, and 7094 I and II's are not for new machines but for conversion from existing 7040, 7070, and 7090 computers respectively.

STOCK MARKET REPORT ON SELECTED EDP FIRMS

April 22, 1966 - May 27, 1966

NEW YORK STOCK EXCHANGE	1966 High	1966 Low	5 weeks Sales in 100's	5 weeks High	5 weeks Low	Last	5 weeks Net Change	5 weeks % Change
Addressograph-Multigraph	77 3/8	54 1/8	2729	76	59 5/8	68 3/8	-7 1/8	-9.44
American R & D	30 7/8	20 1/4	657	30 7/8	21	25 7/8	-4 1/4	-14.11
Ampex Corp.	26 3/4	17	6687	23	17	19 1/2	-2 5/8	-11.86
Burroughs	72 3/8	49 1/4	11,905	72 3/8	51 1/8	65	-2 7/8	-4.24
Control Data	38 1/4	26 3/8	13,078	33	26 3/4	30 1/8	+1/8	+0.42
Dura Corp.	34 3/8	25	569	34 3/8	28	28 1/4	-3/8	-1.17
Electronic Assoc.	27 1/8	16 1/8	1850	22 1/4	16 1/8	17 1/2	-3 3/8	-16.17
General Dynamics	66 1/2	50 7/8	6254	64 3/4	50 7/8	54 3/4	-9 5/8	-14.89
General Electric	120	102 1/4	4038	118	102 1/4	106	-11 1/2	-9.79
Honeywell	96	68 1/2	2810	87 7/8	71 1/8	78	-5 7/8	-6.97
IBM	375	346	1463	375	346	371	-3 1/2	-0.93
Inter. Tel & Tel	78	65 3/4	3969	78	68 3/4	70 7/8	-5 1/2	-7.20
Litton	86 1/2	66 1/2	6676	81 1/4	67	78 1/8	-2 5/8	-3.25
Nat. Cash Register	91 1/2	76	1723	89 3/4	77 1/4	87 1/4	-2 1/2	-2.79
RCA	62 1/4	46 1/8	17,439	59 3/4	47	52 5/8	-7	-11.74
Raytheon	55 1/8	36	11,064	52 1/8	36 1/2	44	-7 1/4	-14.15
SCM	91 7/8	47 1/4	30,734	91 7/8	63 5/8	77 3/4	-2 1/4	-2.81
Singer	64 3/4	51 1/8	1893	63 3/8	51 1/8	55 1/4	-5 1/8	-8.40
Sperry Rand	25	17 1/8	29,913	25	18 1/8	21 5/8	-3 1/8	-12.63
NYSE COMPUTER STOCK AVERAGE							-4.55	-8.01
AMERICAN STOCK EXCHANGE								
ANelex	28	15 3/4	721	24 1/8	15 3/4	17 3/8	-5 3/4	-24.47
Bunker-Ramo	10 1/8	7 1/4	1868	9 7/8	7 5/8	8 1/8	-1 1/2	-15.58
Cal Comp	25 7/8	13 1/4	1289	25 7/8	17 7/8	24	+5 5/8	+30.61
Clary	8	4 5/8	1069	7 7/8	5 1/8	5 3/4	-7/8	-13.21
Computer Application	26 1/4	16 3/4	645	22 5/8	16 3/4	18 7/8	-3 5/8	-16.11
Computer Science	34 7/8	19 1/8	3112	33 7/8	24 1/2	30 1/4	+1 3/4	+6.11
Milgo Elect.	8 7/8	6 3/4	261	8 7/8	6 3/4	6 7/8	-1 1/2	-17.91
Planning Research	36 1/2	21 1/8	383	27 3/4	21 1/2	22 1/8	-1 3/8	-5.85
Potter Instrument	26 3/8	14 5/8	764	25	16	18 1/4	-4 1/2	-19.78
AMEX COMPUTER STOCK AVERAGE							-1.31	-8.46

OVER-THE-COUNTER	1966 High Bid	1966 Low Bid	May 27 Bid	May 27 Asked	5 weeks ago Bid
C-E-I-R	15 1/4	8 7/8	10 7/8	11 3/8	10 5/8
Computer Usage	24	17 3/4	20 1/2	22 1/2	23
Computer Control	25 1/2	14	22	22 3/4	22 1/2
Digitronics	12 3/4	7 7/8	9 3/8	9 7/8	10 1/8
Management Assistance	45 3/4	30 1/4	33 1/8	34 1/8	42 1/4
Scientific Data	74 1/2	44	52	53 1/2	65

Q. 6: What are the chances you will upgrade your B5500 to a B6500?

Nearly all users felt they may need a machine with the speed and memory capacity of the B6500. Most said they would probably stay with Burroughs, barring unforeseen experiences with their present B5500. One user said that he might order a second B5500 rather than upgrading to a B6500 because the B6500 price policy "does not offer a discount on a three year contract".

Overall, Burroughs seems to have earned claim to one of the most satisfied collection of computer users we've run across. With this base to build upon, the B6500 looks like it will become a firm revenue producer in the Burroughs computer product line.

June 15, 1966 Vol. 2, No. 5

E|D|P
INDUSTRY AND MARKET REPORT

A SEMI-MONTHLY NEWSLETTER FOR EXECUTIVES IN THE ELECTRONIC DATA PROCESSING INDUSTRY, AND THE FINANCIAL COMMUNITY.

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CURRENT SURVEY OF IBM 360 CUSTOMERS REVEALS SOFTWARE AND PERIPHERAL EQUIPMENT STILL TROUBLESOME BUT SITUATION IMPROVING

Approximately 58% of all computer systems currently on order are members of IBM's 360 series, according to an analysis of the latest EDP I&MR Monthly Computer Census. This backlog is valued at about $5.4 billion and accounts for about 88% of IBM's backlog of digital computers. Most of these 360's are scheduled for shipment within the next two years.

Of course, most of the 360 backlog consists of orders placed by users acting on confidence in IBM's ability to meet the promises made in their sales presentation, and the acceptance conditions in the computer acquisition contract. When we last surveyed early 360 customers (see issue of Oct. 19, '65), we found reasonable satisfaction with the reliability of the equipment but widespread dissatisfaction with the programming and software support offered by the manufacturer. Continued customer difficulties with the software could endanger the acceptance rate of 360 systems, and therefore the revenue producing power of the backlog.

It has been eight months since our last 360 user survey. The time is right for a new reading on the situation. To do this, we interviewed thirty-four customers with 360 systems installed or on order during the last two weeks. Our survey sample is as follows:

IBM Model	No. Users Contacted	No. On Order Contacted	No. Units Installed	No. Units On Order	Date First Instl	Quarter of Installation 1965 2	3	4	1966 1	2	3	4	1967 1	2	3	4
360/20	5	4	130	6400	12/65	-	-	-	-	5	-	3	-	-	1	-
360/30	9	2	1150	4150	5/65	-	3	2	1	3	1	1	-	-	-	-
360/40	4	4	720	1700	4/65	2	1	-	1	-	3	-	1	-	-	-
360/50	2	1	40	640	8/65	-	-	1	1	-	1	-	-	-	-	-
360/65	2	-	5	105	11/65	-	-	1	-	1	-	-	-	-	-	-
360/75	1	-	3	44	2/66				1	-	-	-	-	-	-	-
TOTALS	23	11	2048	13039	TOTALS	2	4	5	4	9	5	4	1	-	1	-

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Editor's Note: Slippage in the delivery of IBM's software for the system/360 will typically be one-half year after the dates established in April,1964, according to a study made by our staff this past week. The results of this survey are shown in tabular form below:

SOFTWARE	ORIGINAL DATE (Announced 4/64)	REVISED DATE (Announced 1/66)	REVISED SIZE	DELAY (In Quarters)
Control Program (Basic)	4th Q,1965	3/66	-	1
Control Program (Time Sharing)	2nd Q,1966	1/67(Basic)	-	3
		7/67(Queued)	-	5
Assembler				
Design Level 10K	4th Q,1965	3/66	15K	1
44K	4th Q,1965	5/66	-	2
200K	2nd Q,1966	None Listed	-	-
FORTRAN				
Design Level 10K	4th Q,1965	3/66	15K	1
200K	4th Q,1965	6/66	-	2
COBOL				
Design Level 10K	4th Q,1965	3/66	15K	1
44K	2nd Q,1966	11/66	-	2
PL/I				
Design Level 10K	4th Q,1965	None Listed	-	-
44K	4th Q,1965	4/66	-	2
200K	2nd Q,1966	7/67	-	5
Report Program Generator(10K)	4th Q,1965	12/66	15K	4
Simulators				
IBM 7090/7094 & 7070/7074	1st Q,1966	6/66	-	1
IBM 1410/7010 & 7080	2nd Q,1966	10/66	-	2
Sort/Merge				
2400 series tapes & 2311	4th Q,1965	3/66	-	1
7340	2nd Q,1966	4/67	-	4
2301	2nd Q,1966	1/67	-	3
Utilities(10K)	4th Q,1965	3/66	-	1

Here are the questions we asked, and here is what we found, arranged for clarity by the model that the customer has installed or on order.

Q.1: HOW WOULD YOU RATE THE PERFORMANCE TO DATE OF THE IBM HARDWARE, IN LIGHT OF YOUR EXPECTATIONS FOR IT?

360/20 Comments ranged from "equivalent to our expectations" to "excellent" and "real good". However, one user complained that he had trouble loading paper with the 2203 printer, so much so that he wishes he had ordered a 1403. Down-time ranged from practically none to less than 5%.

360/30 Comments such as "fine" and "real good" were common. However, one user, whose company has one 360/30 at each of five branch offices, complained that his colleagues were having card reader and tape drive problems. All but one user (who gave a figure of 25%) reported less than 5% down-time.

360/40 Of four users questioned, one rated the hardware as "very good", another as "better than expected". However, one user disclosed that he has been experiencing printer-trouble, while another criticized the tape drives in his system, claiming that "you have to have an extra one or you'd be dead". Down-time again was reported as very low.

360/50 Both users registered disappointment with some aspect of the hardware in their systems. One user complained that it takes a long time to diagnose problems on his machine. The other complained of tape-drive and paper-loading problems. One user reported 10% down-time.

360/65 One of two users commented that his hardware is "lagging behind expectations". The other reported the performance of his hardware as "normal for a big configuration".

360/75 The one user questioned said it was too early for him to evaluate hardware performance.

Q.2: HOW WOULD YOU RATE IBM'S SOFTWARE AND PROGRAMMING SUPPORT IN LIGHT OF YOUR EXPECTATIONS FOR IT?

360/20 Four of the five users questioned rated software as "excellent" or "very good". The fifth said IBM's "RPG is a good deal", but went on to complain about the situation which existed several months ago. "Then", he said, "even IBM didn't know how to program it (RPG)". This same user complained that RPG wasn't delivered until after his machine was installed, and that by that time he had gotten a copy of RPG from his own company's branch office. While none of the other 360/20 users reported delays in software delivery, one user reports that only 20% of the software to be used in his system will come from IBM.

360/30 Four out of nine users made comments that ranged from "what we have used has been good" and "good so far" to "generally good". No user was really enthusiastic about the 360 software. The remaining five

users all registered complaints. Some sample comments include: "We had many problems at first, especially with IOCS"; "We've had to find our own ways out of software problems"; "As far as software is concerned, they're (IBM) in a prehistoric time". Other users pointed out specific delays with Cobol and RPG. In speaking of the delay in the delivery of PL/I, one user stated that he had given up waiting for it and now he really doesn't care when it is made available.

Only two out of nine users said they anticipate developing any software on their own, with the reason frequently given as "We have enough work on our hands already debugging their (IBM) software".

360/40 Comments of 360/30 were echoed by 360/40 users. They included: "The software is not up to the operating environment", and "We will not touch IBM's new version of its emulator". According to another user, "Everyone was disappointed. IBM oversold the 360. Once you accept reality, things look better."

One user undertook the writing of their own specialized software for, as he stated, "Since we were among the very early users (June 1965), we didn't expect IBM to have anything more than the fairly trivial programs they did have".

360/50 One of the two users complained that they (IBM) "don't have enough personnel to aid with software debugging". The other user questioned rated the software as "pretty weak" and commented that "good hardware isn't any good, without good software". Only one of these users plans to do any software development.

360/65 One user commented that the software "hasn't been up to specifications", but things are "very rapidly improving". According to this user, their experience with the software last week was "100% improved" over the previous week. Again, one user plans to do extensive software development, in queued teleprocessing.

360/75 The only user questioned said it was too soon to judge the software, for most of the advanced software packages, operating systems and compilers were not ready yet.

Q.3: DID YOUR 360 REPLACE ANOTHER COMPUTER?
Q.4: HOW MUCH OF A PROBLEM HAS REPROGRAMMING BEEN?

360/20 Of the nine computers (either installed or on order), 5 replaced Unit Record Equipment, 2 replaced IBM 1401's, 1 replaced an IBM 1440, and 1 replaced an IBM 1620. Only the manager of the system which previously included a 1440 reported any reprogramming trouble, and at that, he stated there would have been no trouble at all "if things had been the way they should have been".

The four computers replaced by 360's were all kept for the two-month transition period.

360/30 Of the eleven computers, 7 replaced 1401's, 1 each replaced an IBM 1410, IBM 1460, IBM 7074, and a GE 210.

Reprogramming was rated as a "minor" problem by about half the users, and as a "monster" by the remaining users. One philosophical user stated that, while reprogramming would be a great problem, his operation would benefit as his "house is put in order".

Five of the nine users questioned stated that they still were using the computer which is being replaced by the 360, but all of these stated that they intended to keep these computers for no longer than the two-month transition period.

360/40 Of the eight computers, 3 replaced (or will replace) 1401's; 2 replaced 1460's; 2 replaced 1620's; and 1 replaced a Burroughs 205.

Comments on reprogramming ranged from "not much of a problem" to "can't say yet" to "we can use the experience in programming".

Five of the eight users still have their "old" equipment, but again all of these are operating on the two-month rental program.

360/50 While one computer was not replacing any other computer, the other two 360's were said to be replacing an IBM 7070-1401 and an IBM 905 respectively.

The one user who commented on the problem of reprogramming stated that he and his associates had "spent an awful lot of hours reprogramming, with much overtime work".

The user who previously operated with 7070-1401's stated that he would keep those two computers for about one year.

360/65 Of the two users, one stated that his new 360 will replace a 7094-II, but at a still undetermined future date. This same user reported no major reprogramming difficulties.

The other user stated that the one 360/65 would eventually replace a 7044 and 7094 (in direct couple), three 7010's and a 7040. At present, this user estimates he would retain this equipment for four months (the extended CRP plan).

360/75 The one user questioned stated that within six months the 7094-1460 configuration, which the 360 is replacing, would leave his site.

Q.5: HOW WOULD YOU RATE IBM'S TRAINING PROGRAM IN LIGHT OF YOUR EXPECTATIONS FOR IT?

360/20 While one user rated IBM's training program as "the best there is" and another rated it as "very good", several others made comments such as "I was an early pupil and I wouldn't have given it a high grade then, but it's probably better now", and another user felt that "the manuals left a lot to be desired".

360/30 Comments such as "very good", "as usual - good", and "relatively good" were intermixed with comments such as "not enough training for operators" and "the material was as new to them as it was to us". Another user complained that "the classes run too quickly, and the documentation is terrible".

360/40 While a few users rated the training as "very good", others rated it as "fair" and "not outstanding". Specific complaints concerned big classes, no training for operators, and the inability of instructors to answer all but very simple questions.

360/50 While one user hasn't had any courses, the other rated the training as "pretty poor" and went on to criticize the service which service engineers have given him. He attributed the poor quality of this service (slow, inaccurate) to poor communication which he thinks exists within IBM, because it has "grown so fast" and has "many different levels of people. . .".

360/65 The one user who commented rated the training as "good" but criticized the lack of coverage of software in the courses he took.

360/75 The one user questioned had "no first hand knowledge of the training program".

Q.6: HOW LONG DO YOU INTEND TO KEEP YOUR IBM 360?
Q.7: WITH WHAT MAKE AND MODEL OF COMPUTER DO YOU PLAN TO REPLACE YOUR 360?

360/20 Of the five users (or future users) who replied to the question, planned time of upgrading ranged from 2 to 7 years in the future, with only two users definitely stating that purchase or rental of a 360/30 was planned.

360/30 Of the eleven users (or future users) questioned, three couldn't predict the future of their 360's, while two reported that they would "stay in the 360 family". Two other users reported that they would add memory capacity to their present units, while the remaining users gave the following specific comments:

(1) Add a 40 in August, a 50 in spring.
(2) Change one 30 to a 40, other 30 to a 50.
(3) Get another 30, and trade this one for a 40.
(4) Add a 20.

360/40 Four users responded that they didn't know what was in store for their 360, and one user commented that he did not foresee any additions to his system. Other responses included:

(1) Will get a 50 or a 65/7 in two years to replace this.
(2) Will get another 40 in a year.
(3) Will get a different 360 in five years.

360/50 One user predicted his system would be upgraded to include a 65/7 or 75, while another predicted this would be true for his system as well, with the addition of a couple of 30's. The third user questioned stated that he would enlarge the memory capacity of his system, rent a 40, and then upgrade that to another 50.

360/65 One 65 user stated that he has a 360/67 as well and did not presently contemplate a change in his system. The other user stated that he has a 30, 40 and 50 as well as the 65, and that he can foresee replacing his 50 with another 65.

360/75 The one user questioned stated that at present he has a 40 and a 75, with a 50, 75 and 91 on order. He further stated that the super-computer IBM 360/91 would replace either one or both of his 75's.

CONCLUSIONS:

Early 360 users have, in a sense, paid the price of the trail-blazers - a leg full of thorns. They have had their operations "knocked dead" by faulty peripheral equipment and bug-infested (and late) software. But through their suffering has come understanding and improvements, for those users interviewed who just recently received their equipment and software seem to be experiencing fewer problems than did the early users at the same stage in their operations of the 360.

Significantly, early users have retained their loyalty to IBM in face of the mistakes and delays experienced in the introductory phase of 360 use. They have not lost faith in the ability of IBM to continue to improve its hardware and software, as evidenced by the large percentage who have ordered or contemplate ordering advanced 360 systems.

CONTROL DATA CONTINUES ITS ADVANCE ON THE 6000 SERIES

CDC continues to pick up the pace on its 6000 series sales. As of the present they are reported to have 40 units installed or on order for delivery during the next two years. Production on the machine is expected to double, to two per month, beginning in July. Seventeen units have now been shipped. . . eleven of which have been accepted by customers. . .the remainder are undergoing acceptance tests. CDC President William Norris recently said that accepted 6000 series computers are operating with an average uptime of 94%. He concluded: "We are extremely pleased to be the leader in the super-scale computer market, having surmounted the technical difficulties inherent in systems representing such an advance in the state of the art."

IBM put emphasis behind Norris's words last week by adding the following paragraph to the final prospectus covering their recent rights offering of 1,324,136 shares at $285 per share (the paragraph was not included in the "red herring"):

> "The large-scale Model 90 Series of System/360, a limited production model, uses special ultra high-speed circuits which are currently encountering technical difficulties. It is anticipated that these difficulties will result in some delays in deliveries of the Model 90 series as well as an inventory loss estimated at $15,000,000."

Apparently delivery of the 90 units is now scheduled for late '67, rather than in spring '67.

STOCK MARKET REPORT ON SELECTED EDP FIRMS

May 28,1966 - June 10, 1966

NEW YORK STOCK EXCHANGE	1966 High	1966 Low	2 weeks Sales in 100's	2 weeks High	2 weeks Low	Last	2 weeks Net Change	2 weeks % Change
Addressograph-Multigraph	77 3/8	54 1/8	635	71 3/8	63 3/8	70 5/8	+2 5/8	+3.84
American R & D	30 7/8	20 1/4	82	26 3/8	23 5/8	24 1/4	-1 5/8	-6.28
Ampex Corp.	26 3/4	17	1535	21 3/8	18 1/8	21	+1 1/2	+7.69
Burroughs	72 3/8	49 1/4	3291	70 1/8	60 3/4	70 1/8	+5 1/8	+7.88
Control Data	38 1/4	26 3/8	4895	34 5/8	28 3/8	34 5/8	+4 1/2	+14.94
Electronic Assoc.	27 1/8	16 1/8	470	19 3/8	17	19 1/8	+1 5/8	+ 9.28
General Dynamics	66 1/2	50 1/4	1264	55	50 1/4	54	-3/4	-1.37
General Electric	120	102 1/4	1166	108 1/2	103 3/4	108 1/2	+3 1/4	+3.07
Honeywell	96	68 1/2	538	85	76 1/2	85	+7	+8.97
IBM	375	332 1/2	1442	370	332 1/2	349	-20 1/4	-5.46
Inter. Tel. & Tel.	78	65 3/4	816	72 1/4	69 1/4	71 1/2	+5/8	+0.88
Litton	86 1/2	66 1/2	1200	78 3/4	72 3/8	78 1/4	+1/8	+0.16
Nat. Cash Register	91 1/2	76	405	87 1/8	81 1/2	83 1/2	-3 3/4	-4.30
RCA	62 1/4	46 1/8	3352	53 1/2	49 1/4	53 1/4	+5/8	+1.18
Raytheon	55 1/8	36	2353	46	39 5/8	45 7/8	+1 7/8	+4.26
SCM	91 7/8	47 1/4	7160	78 7/8	68 1/2	78	+1/4	+0.32
Singer	64 3/4	51 1/8	375	55 5/8	51 1/2	52 7/8	-2 3/8	-4.30
Sperry Rand	25	17 1/8	5962	23 1/4	20	23	+1 3/8	+6.36
Teledyne	129 3/4	87	4370	129 1/2	113 1/2	118 1/2	-11	-8.49
NYSE COMPUTER STOCK AVERAGE							-0.48	+2.03
AMERICAN STOCK EXCHANGE								
ANelex	28	15 3/4	149	18 1/8	15 7/8	17 1/8	-5/8	-3.60
Bunker-Ramo	10 1/8	7 1/4	149	8 1/8	7 3/4	8	-1/8	-1.54
Cal Comp	25 7/8	13 1/4	185	24 5/8	21 1/2	24 3/8	+3/8	+1.56
Clary	8	4 5/8	101	5 7/8	5 1/4	5 3/8	-3/8	-6.52
Computer Application	26 1/4	16 3/4	141	20 7/8	18 1/8	19	+1/8	+0.66
Computer Science	34 7/8	19 1/8	730	31 3/8	28 1/4	30 1/8	-1/8	-0.41
Milgo Elect.	8 7/8	6 3/4	42	7 1/8	6 7/8	7	+1/8	+1.82
Planning Research	36 1/2	21 1/8	40	22 3/8	21 1/8	21 1/4	-7/8	-3.95
Potter Instrument	26 3/8	14 5/8	93	18 3/8	16 1/2	17 1/4	-1	-5.48
AMEX COMPUTER STOCK AVERAGE							-0.28	-1.94

OVER-THE-COUNTER	1966 High Bid	1966 Low Bid	June 10 Bid	June 10 Asked	2 weeks ago Bid
C-E-I-R	15 1/4	8 7/8	11 1/8	11 1/2	10 7/8
Computer Usage	24 1/2	17 3/4	22 1/2	25 1/8	20 1/2
Computer Control	25 1/2	14	22	22 3/4	22
Data Products	4	2 3/8	3 1/8	3 5/8	2 5/8
Digitronics	12 3/4	7 7/8	8 3/4	9 3/4	9 3/8
Fabri-Tek	26	8 7/8	8 7/8	9 3/8	11 1/2
Management Assistance	45 3/4	30 1/4	34 1/2	35 1/4	33 1/8
Memorex	54 3/4	31 1/2	51	52	45 1/2
Mohawk Data Sciences	28 3/4	19	28 3/4	31 1/8	21 1/2
Scientific Data	74 1/2	44	57 1/2	58 1/2	52

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E|D|P
INDUSTRY AND MARKET REPORT
A SEMI-MONTHLY NEWSLETTER FOR EXECUTIVES IN THE ELECTRONIC DATA PROCESSING INDUSTRY, AND THE FINANCIAL COMMUNITY

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COMPUTER CUSTOMER LOYALTY STUDY INDICATES IBM, UNIVAC HAVE NET LOSS OF CUSTOMERS TO COMPETITORS

IBM, although it is having success in switching some computer customers of each of its major competitors to its equipment, is experiencing a net loss of customers in the process. This was one trend indicated by the results of a computer customer loyalty study just completed by our research staff.

The study examined the brand of computer equipment being ordered by current computer users who have had at least three years of experience with their current equipment. The study determined the number of such customers who were ordering their new computers from the manufacturer of their current equipment vs. ordering from a competitor. The complete study covered a random selection of 559 computer users with new computers on order in the metropolitan areas of Chicago, Cleveland, Los Angeles, Minneapolis, New York, Philadelphia, and San Francisco.

The results of the study indicate that Univac is suffering the severest loss of customers at the current time, with 13 of the 21 Univac customers surveyed switching to IBM equipment, and two to GE equipment. Most of the switching users were Univac 1004 users, who have IBM 360/20's or 360/30's on order. However, these orders were placed prior to the recent announcement of Univac's low cost computer line, the 9000 series. The effect of this new line in helping Univac boost its retention of current customers is not yet reflected in the marketplace.

Honeywell appears to be the most successful in wooing away IBM users, capturing 11 of the 32 IBM users going elsewhere. Most of these switchers have current IBM 1400 series computers installed, with H-200's on order.

Control Data, although suffering from a low customer loyalty ratio (see table) has been relatively successful in capturing orders from current users of competitive computers. Since most of CDC's computer replacement sales are for medium- or large-scale computers, the dollar value of this competitive activity is substantial.

The study did not cover the ordering preferences of firms putting their first computer on order. Firms such as NCR, Honeywell, Burroughs, IBM and Univac, which offer attractively priced small computer systems stand to benefit most from this new customer activity. Orders from such first computer customers account for

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15%-20% of the value of the total computer industry backlog, EDP I&MR estimates. Traditionally, IBM captures over 80% of this new business.

A summary of the results of the study appears below:

SUMMARY - CUSTOMER LOYALTY PROFILE

VENDOR	(1) # Customers Switched from Competitors	(1) Customer Switched from	(2) # Customers Lost	(2) Customer Switched to	(3) # Customers Ordering New Product Line	% Customers Loyal (3) / (2) + (3)	% Competitive Gain or Loss of Customers (1) - (2) / (2) + (3)
BURROUGHS	3	3 IBM	1	1 IBM	6	86%	29%
CONTROL DATA	5	4 IBM 1 GE	1	1 IBM	1	50%	200%
GE	9	6 IBM 2 UNIV 1 HON	1	1 CDC	8	89%	89%
HONEYWELL	11	11 IBM	5	3 IBM 1 GE 1 UNIV	9	64%	43%
IBM	20	1 BUR 1 CDC 1 GE 3 HON 0 NCR 1 RCA 13 UNIV	32	3 BUR 4 CDC 6 GE 11 HON 1 NCR 4 RCA 3 UNIV	396	93%	-3%
NCR	1	1 IBM	0		11	100%	9%
RCA	4	4 IBM	1	1 IBM	9	90%	30%
UNIVAC	4	3 IBM 1 HON	15	13 IBM 2 GE	6	29%	-52%

U.S. COMPUTER EXPORTS SHOW 18% DECLINE

Operation of overseas computer manufacturing facilities by U.S. firms took a sharp bite out of computer equipment exports during 1965. Preliminary figures released by the U.S. Commerce Department's Business and Defense Services Administration reveal that computer exports from the U.S. totaled $145 million in '65, a decline of 18% from $176 million in '64. In contrast, the value of U.S.-built computers delivered during 1965 increased 5% over the previous year. GE, Honeywell, IBM, NCR and RCA now produce outside the U.S. . . . at either their own plants or those of licensees . . . most of the computers they deliver to customers in Europe or the Orient.

Export of EDP accessories and parts to support the growing number of older computers installed overseas increased 87%, however, from $41.5 million in '64 to $77.5 million in '65.

Of the total computer export figure, digital computers accounted for $96 million and analog computers (largely process control equipment), for $49 million.

A breakdown by country of this export activity is:

Country	Computers (in $millions)	Parts & Accessories (in $millions)
United Kingdom	$25.3	$15.1
Canada	19.9	4.5
Japan	19.7	11.1
West Germany	18.4	15.3
France	17.0	18.6
Switzerland	5.9	.6
Sweden	4.4	2.4
Netherlands	4.2	1.8
Italy	3.9	2.2
Mexico	2.3	.3
Belgium & Luxembourg	1.8	.2
Venezuela	.7	.1
Argentina	.6	.1
Other	21.3	4.8

REAL-TIME MANAGEMENT INFORMATION SYSTEMS DEBUNKED

". . . of all the ridiculous things that have been foisted on the long-suffering executive in the name of science and progress, the real-time management information system is the silliest." This charge, a direct attack on a prime marketing theme of the computer industry, is made by Harvard Business School Prof. John Dearden in "Myth of Real-Time Management Information", an article well worth reading in the May - June 1966 issue of Harvard Business Review.

Prof. Dearden analyzes the major functions of top management and finds that real-time management information is a costly commodity that cannot practically contribute to the effectiveness with which a top manager performs his tasks. Dearden allows only one possible exception. . .in the operating control of logistics systems. . .and even here he feels that any real-time information bank is best monitored by a subordinate.

Dearden feels the computer industry is selling real-time management information systems with a pitch based upon three major fallacies: 1) the fallacy that "knowing everything that is happening as soon as it happens" will improve management control; 2) the fallacy that the "scientific " way to manage is to use a computer; and 3) the fallacy that management control systems are merely higher manifestations of logistics systems.

Industry antagonist Dearden builds his case on points traced with a broad brush, but his viewpoint deserves serious consideration by RTMIS buyer and seller alike.

DIGITAL EQUIPMENT'S NEW COMPUTER SELLS FOR LESS THAN $10,000; PLANS PUBLIC STOCK OFFERING

DEC has just outdistanced a milestone in the computer industry by announcing a digital computer system with 4K core storage and teletype terminal for a selling price under $10,000. Called the PDP-8/S, the new computer is a slowed down version of DEC's highly successful $18,000 PDP-8 (over 500 units sold to date). The 8/S offers an 8 usec. memory cycle vs. the 1.5 usec. in the PDP-8, and uses a serial rather than a parallel arithmetic unit. Software includes a FORTRAN compiler and an assembly language.

The slower memory speed of the PDP-8/S and the fewer circuit cards in its serial arithmetic unit permit automatic production line techniques which make the remarkably low purchase price possible. DEC expects to produce 1000 of the new units during the first year. Initial sales have been made to manufacturers of instruments and control systems for incorporation into their new products. A 90 day delivery and a "liberal" OEM discount is being offered such customers. Sales directly to the end user will not be made before the beginning of next year when additional peripheral equipment is expected to be offered with the new computer.

DEC passed another milestone in announcing that it at last intends to go public . . . It filed a registration statement on July 18, 1966 with the SEC for a proposed public offering of 375,000 shares of common stock, of which 235,000 shares are for the purpose of raising additional funds for the company, and 140,000 shares are for the account of a selling stockholder. Part of the proceeds will be used to repay outright a $300,000 note held by American R&D Corp. AR&D holds 68% of the voting securities of DEC. Lehman Brothers is underwriting the offering.

VENEZUELA HAS OVER 60 COMPUTERS IN USE

South America is providing one of the most rapidly growing markets for computers. A recent survey by our correspondent in Venezuela indicates that there are now at least 63 computers installed in that country, with an installed value of just over $19 million. This is .275¢ worth of computers installed per dollar of Gross National Product. (This represents a computer density equal to about one-fourth that of the United States, where about 1.2¢ worth of computers are installed per dollar of GNP.)

The Venezuelan government is the principal computer user, with 27 installations; oil interests are close behind. A census of computers in Venezuela shows that the installed computers include:

No. Installed	Model	No. Installed	Model	No. Installed	Model
2	Burroughs B200	1	IBM 1460	1	NCR 315
1	IBM 360/30	7	IBM 1620	1	Univac File Computer
40	IBM 1401	1	IBM 7070	2	Univac Solid State
3	IBM 1440	2	IBM 7074	2	Univac 1004

Burroughs Corporation reports record orders, revenues, and earnings during the first six months of '66. Orders for EDP Systems were up 51% in the first five months compared to the same period last year. In the period Burroughs introduced three integrated circuit computers, the B2500, B3500 and B6500. Orders for electronic accounting systems were up 67% in the same period. Overall Burroughs' commercial backlog was up 29% in the first half.

Revenue for the six months was $236.6 million, up 13% from $209.1 million last year. Net earnings for the six months were $11.7 million, up from $5.9 million in the first half of '65. Per share earnings including a non-recurring capital gain of $.13 were $1.48 versus $.80 in the first six months of 1965. Second quarter revenues were $122.2 million, exceeding last year's revenue of $108.3 million by 13%. Net earnings for the quarter were $6.4 million or $.80 per share versus $3.1 million or $.42 per share in 1965. Chairman Ray Eppert predicts that 1966 net earnings from operations should be about $3.35 per share.

California Computer Products traces a rising sales and earnings curve out of the plotter business. The Anaheim, Calif., firm reports record sales of $2,300,000 during the last three months, with earnings of 43¢ per share. $3,500,000 in new orders were received during the quarter bringing the backlog as of the end of June to $3 million compared with $1 million a year ago.

Sales and other income for the fiscal year ended June 30 amounted to $6,160,000, an increase of 49% over the previous year. Earnings reached $552,000 or 83¢ per share, a 23% increase over last year. The sale of proprietary digital plotting equipment accounted for 88% of CalComp's total revenue during fiscal '66, up from 77% in the previous fiscal year.

Memorex Corporation benefits from the large increase in magnetic computer tape sales as users update their tape libraries while changing to third generation computers. The company reports net income for the six months ended June 30 of $1,216,000, a 131% increase over the corresponding figure a year earlier. Earnings per share were $1.21 compared with 54¢ in the first half of 1965. Net sales of the magnetic tape manufacturer for the period were $10,582,000, 82% greater than a year earlier.

Memorex is also filing a registration statement with the SEC covering a proposed cash offering of $12,000,000 convertible subordinated debentures due August 1, 1986, and a secondary offering of 95,150 shares of common stock ($1 par value). The combined offering is expected in mid-August. Blyth & Co., Inc. and Smith, Barney & Co., Inc., are co-managers. Approximately $6 million of the net proceeds of the sale of debentures will be applied to the repayment of bank loans, including indebtedness incurred in the firm's 1966 facilities expansion program. The company is doubling its facilities and manufacturing capacity at its Santa Clara, Calif., plant. Completion of construction is expected in late '66.

Recognition Equipment, Inc., Dallas, Tex., has filed a statement with the SEC to register $8.5 million of 5 3/4% convertible subordinated debentures for sale through underwriters headed by White, Weld & Co., New York. The firm will use the proceeds to finance the cost of leased optical character recognition systems, and for research & development, product marketing and manufacturing.

(con't on last page)

MONTHLY COMPUTER CENSUS

The number of electronic digital computers installed or in production at any one time has been increasing at a bewildering pace in the past several years. New vendors have come into the market, and familiar machines have gone out of production. Some machines have been received with open arms by users -- others have been given the cold shoulder.

To aid readers of the EDP I&MR in keeping with this mushrooming activity, we compile and publish this monthly report on the number of general purpose electronic computers made by American-based companies which are installed or on order as of the preceding month. These figures included installations and orders outside the United States. We update this computer census monthly, so that it will serve as a "box score" of progress in following the growth of the American computer industry, and of the computing power it builds.

In general, manufacturers in the computer field do not officially release installation and on order figures. The figures in this table are developed through a continuing market survey conducted by our research staff. This market research program develops a documented data file on over 80% of the computer installations in the United States. A similar program is conducted for overseas installations.

Comments on this census from informed readers will be welcomed.

AS OF MAY 10, 1966

NAME MANUFACTURER	NAME OF COMPUTER	SOLID STATE?	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS	NUMBER OF UNFILLED ORDERS
Advanced Scientific Instruments	ASI 210	Y	$3850	4/62	25	0
	ASI 2100	Y	$4200	12/63	7	0
	ADVANCE 6020	Y	$4400	4/65	9	5
	ADVANCE 6040	Y	$5600	7/65	3	6
	ADVANCE 6050	Y	$9000	2/66	2	6
	ADVANCE 6070	Y	$15,000	10/65	2	6
	ADVANCE 6130	Y	$1000	11/66	0	3
Autonetics	RECOMP II	Y	$2495	11/58	44	X
	RECOMP III	Y	$1495	6/61	10	X
Bunker-Ramo Corp.	BR-130	Y	$2000	10/61	159	5
	BR-133	Y	$2400	5/64	20	3
	BR-230	Y	$2680	8/63	15	X
	BR-300	Y	$3000	3/59	36	X
	BR-330	Y	$4000	12/60	34	X
	BR-340	Y	$7000	12/63	20	X
Burroughs	205	N	$4600	1/54	49	X
	220	N	$14,000	10/58	40	X
	E101-103	N	$875	1/56	143	X
	B100	Y	$2800	8/64	140	12
	B250	Y	$4200	11/61	95	4
	B260	Y	$3750	11/62	225	8
	B270	Y	$7000	7/62	151	12
	B280	Y	$6500	7/62	125	15
	B300	Y	$8400	7/65	75	88
	B2500	Y	$5000	1/67	0	22
	B3500	Y	$14,000	5/67	0	18
	B5500	Y	$22,000	3/63	50	10
	B8500	Y	$200,000	2/67	0	1
Clary	DE-60/DE-60M	Y	$525	7/60	355	4
Computer Control Co.	DDP-24	Y	$2500	5/63	70	8
	DDP-116	Y	$900	4/65	55	30
	DDP-124	Y	$2050	3/66	14	18
	DDP-224	Y	$3300	3/65	22	22
Control Data Corporation	G-15	N	$1600	7/55	310	X
	G-20	Y	$15,500	4/61	23	X
	LGB-21	Y	$725	12/62	125	X
	LGP-30	semi	$1300	9/56	120	X
	RPC-4000	Y	$1875	1/61	55	X
	160*/160A/160G	Y	$1750/$4000/$12,000	5/60;7/61;3/64	450	5
	924/924A	Y	$11,000	8/61	29	X
	1604/1604A	Y	$45,000	1/60	59	X
	1700	Y	$4000	5/66	4	70
	3100	Y	$7500	12/64	70	35
	3200	Y	$12,000	5/64	90	X
	3300	Y	$15,000	9/65	8	38
	3400	Y	$25,000	11/64	19	X
	3500	Y	$30,000	9/66	0	6
	3600	Y	$58,000	6/63	51	2
	3800	Y	$60,000	2/66	2	12
	6400	Y	$50,000	5/66	1	14
	6600	Y	$85,000	8/64	13	9
	6800	Y	$130,000	4/67	0	4
Data Machines, Inc.	620	Y	$900	11/65	6	32
Digital Equipment Corp.	PDP-1	Y	$3400	11/60	60	X
	PDP-4	Y	$1700	8/62	55	2
	PDP-5	Y	$900	9/63	112	1
	PDP-6	Y	$10,000	10/64	18	5
	PDP-7	Y	$1300	11/64	64	48
	PDP-8	Y	$525	4/65	250	280
El-tronics, Inc.	ALWAC IIIE	N	$1820	2/54	21	X
Electronic Associates, Inc.	8400	Y	$7000	6/65	4	6
Friden	6010	Y	$600	6/63	400	85
General Electric	115	Y	$1375	12/65	65	500
	205	Y	$2900	6/64	45	X
	210	Y	$16,000	7/59	50	X
	215	Y	$6000	9/63	56	X
	225	Y	$8000	4/61	214	X
	235	Y	$10,900	4/64	62	5
	415	Y	$7300	5/64	150	70
	425	Y	$9600	6/64	60	45
	435	Y	$14,000	10/64	25	18
	625	Y	$45,000	12/64	13	25
	635/645	Y	$55,000	12/64	8	30
Honeywell Electronic Data Processing	H-120	Y	$2600	1/66	60	300
	H-200	Y	$5700	3/64	730	100
	H-400	Y	$8500	12/61	120	X
	H-800	Y	$22,000	12/60	86	3
	H-1200	Y	$7300	2/66	5	49

NAME OF MANUFACTURER	NAME OF COMPUTER	SOLID STATE?	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS	NUMBER OF UNFILLED ORDERS
Honeywell (cont'd)	H-1400	Y	$14,000	1/64	12	1
	H-1800	Y	$35,000	1/64	18	6
	H-2200	Y	$13,000	1/66	5	45
	H-4200	Y	$20,500	6/66	0	8
	H-8200	Y	$35,000	3/67	0	3
	DATAmatic 1000	N	$40,000	12/57	4	X
IBM	305	N	$3600	12/57	162	X
	360/20	Y	$1800	12/65	130	6400
	360/30	Y	$7500	5/65	1150	4150
	360/40	Y	$15,000	4/65	720	1700
	360/44	Y	$10,000	9/66	0	535
	360/50	Y	$26,000	8/65	40	640
	360/62	Y	$55,000	11/65	1	X
	360/65	Y	$50,000	11/65	5	105
	360/67	Y	$75,000	9/66	0	55
	360/75	Y	$78,000	2/66	3	44
	360/90 Series	Y	$140,000	6/67	0	9
	650	N	$4800	11/54	225	X
	1130	Y	$1200	11/65	200	3700
	1401	Y	$6600	9/60	6600	300
	1401-G	Y	$1900	5/64	1500	65
	1410	Y	$14,200	11/61	755	110
	1440	Y	$4800	4/63	3100	450
	1460	Y	$9000	10/63	2000	135
	1620 I, II	Y	$4000	9/60	1700	50
	1800	Y	$7600	1/66	10	270
	701	N	$5000	4/53	1	X
	7010	Y	$22,600	10/63	192	35
	702	N	$6900	2/55	7	X
	7030	Y	$160,000	5/61	6	X
	704	N	$32,000	12/55	37	X
	7040	Y	$22,000	6/63	118	14
	7044	Y	$32,000	6/63	128	20
	705	N	$38,000	11/55	60	X
	7070, 2, 4	Y	$27,000	3/60	336	X
	7080	Y	$55,000	8/61	80	X
	709	N	$40,000	8/58	11	X
	7090	Y	$63,500	11/59	45	1
	7094	Y	$72,500	9/62	126	5
	7094 II	Y	$78,500	4/64	120	12
Monroe Calculating Machine Co.	Monrobot IX	N	Sold only - $5800	3/58	145	X
	Monrobot XI	Y	$700	12/60	500	100
National Cash Register Co.	NCR -304	Y	$14,000	1/60	24	X
	NCR - 310	Y	$2500	5/61	20	X
	NCR - 315	Y	$8500	5/62	400	40
	NCR - 315-RMC	Y	$12,000	9/65	20	25
	NCR - 390	Y	$1850	5/61	1120	25
	NCR - 500	Y	$1500	10/65	300	800
Philco	1000	Y	$7010	6/63	20	X
	2000-210, 211	Y	$40,000	10/58	18	X
	2000-212	Y	$52,000	1/63	11	X
Radio Corporation of America	Bizmac	N	$100,000	-/56	2	X
	RCA 301	Y	$7000	2/61	647	5
	RCA 3301	Y	$17,000	7/64	50	14
	RCA 501	Y	$14,000	6/59	99	2
	RCA 601	Y	$35,000	11/62	5	X
	Spectra 70/15	Y	$3500	9/65	35	100
	Spectra 70/25	Y	$5000	9/65	14	60
	Spectra 70/35	Y	$9000	11/66	0	65
	Spectra 70/45	Y	$15,000	11/65	6	125
	Spectra 70/55	Y	$30,000	7/66	0	14
Raytheon	250	Y	$1200	12/60	170	X
	440	Y	$3500	3/64	14	3
	520	Y	$3200	10/65	9	7
Scientific Control Systems	650	Y	$500	5/66	0	3
	660	Y	$2000	10/65	3	2
	670	Y	$2600	5/66	0	2
Scientific Data Systems Inc.	SDS-92	Y	$1500	4/65	42	40
	SDS-910	Y	$2000	8/62	173	12
	SDS-920	Y	$2900	9/62	116	10
	SDS-925	Y	$3000	12/64	16	20
	SDS-930	Y	$3400	6/64	110	30
	SDS-940	Y	$10,000	4/66	2	15
	SDS-9300	Y	$7000	11/64	25	8
	Sigma 7	Y	$12,000	12/66	0	16
Systems Engineering Labs	SEL-810A	Y	$1000	9/65	19	11
	SEL-840A	Y	$1400	11/65	4	2
UNIVAC	I & II	N	$25,000	3/51 & 11/57	29	X
	III	Y	$20,000	8/62	82	1
	File Computers	N	$15,000	8/56	18	X
	Solid-State 80I, II, 90 I, II & Step	Y	$8000	8/58	270	X
	418	Y	$11,000	6/63	75	40
	490 Series	Y	$35,000	12/61	94	63
	1004	Y	$1900	2/63	3350	160
	1005	Y	$2400	4/66	50	200
	1050	Y	$8000	9/63	290	60
	1100 Series (except 1107)	N	$35,000	12/50	12	X
	1107	Y	$55,000	10/62	30	2
	1108	Y	$65,000	9/65	8	20
	LARC	Y	$135,000	5/60	2	X
				TOTALS	34,219	23,070

X = no longer in production.

* To avoid double counting, note that the Control Data 160 serves as the central processor of the NCR 310. Also, many of the orders for the IBM 7044, 7074, and 7094 I and II's are not for new machines but for conversion from existing 7040,7070 and 7090 computers respectively

STOCK MARKET REPORT ON SELECTED EDP FIRMS

June 10, 1966 - July 1, 1966

NEW YORK STOCK EXCHANGE	1966 High	1966 Low	3 weeks Sales in 100's	3 weeks High	3 weeks Low	Last	3 weeks Net Change	3 weeks % Change
Addressograph-Multigraph	77 3/8	54 1/8	1735	73 3/8	62 1/2	62 5/8	-8	-11.33
American R & D	30 7/8	20 1/4	311	28 7/8	24 1/8	25 5/8	+1 3/8	+5.67
Ampex Corp.	26 3/4	17	3452	22 7/8	20	21 1/2	+1/2	+2.38
Burroughs	78 5/8	49 1/4	8158	78 5/8	67 1/4	73	+3 1/8	+4.46
Control Data	39	26 3/8	13,924	39	33 3/8	36	+1 3/8	+3.97
Electronic Assoc.	27 1/8	16 1/8	1127	21 1/2	18 3/4	19 3/8	+1/4	+1.31
General Dynamics	66 1/2	50 1/4	2028	57 5/8	51 3/8	52 3/8	-1 5/8	-3.01
General Electric	120	102 1/4	2188	115 1/4	105 7/8	106 1/4	-2 1/4	-2.07
Honeywell	96	68 1/2	1023	91	82 1/2	84 3/4	-1/4	-0.29
IBM	375	332 1/2	2262	366 1/2	340 1/2	354 1/2	+5 1/2	+1.58
Inter. Tel & Tel	78 7/8	65 3/4	2385	78 7/8	71 1/4	75 3/8	+4 1/4	+5.94
Litton	86 1/2	66 1/2	2160	81	72 1/4	76 5/8	-1 5/8	-2.08
Nat. Cash Register	91 1/2	76	834	88	83 3/4	84 1/4	+1 1/8	+1.35
RCA	62 1/4	46 1/8	6661	54 1/2	48 5/8	50 1/4	-2 3/4	-5.16
Raytheon	55 1/8	36	4621	48 3/8	42 1/2	44 3/4	-1 1/8	-2.45
SCM	91 7/8	47 1/4	15,054	89 1/2	75	79 3/8	+1 1/2	+1.92
Singer	64 3/4	51 1/8	749	55 1/8	51 1/2	52 1/8	-3/4	-1.42
Sperry Rand	28	17 1/8	29,838	28	22 7/8	27 7/8	+4 7/8	+21.19
Teledyne	133	87	7388	133	111 1/2	117 1/4	-1 1/4	-1.05
NYSE COMPUTER STOCK AVERAGE							+0.22	+1.10
AMERICAN STOCK EXCHANGE								
ANelex	28	15 3/4	259	18 3/4	16 3/8	16 3/4	-3/8	-2.19
Bunker-Ramo	10 1/8	7 1/4	1047	9 1/2	7 7/8	8 1/2	+1/2	+6.25
Cal Comp	25 7/8	13 1/4	237	24 5/8	21 3/4	23	-1 3/8	-5.64
Clary	8	4 5/8	240	6 1/4	5 1/8	5 3/4	+3/8	+6.98
Computer Applications	26 1/4	16 3/4	267	20 3/4	17 1/4	17 3/4	-1 1/4	-6.58
Computer Science	37 1/4	19 1/8	2822	37 1/4	30 1/2	33 7/8	+3 3/4	+12.45
Milgo Electronics	8 7/8	6 3/4	51	7 1/4	6 3/4	7 1/8	+1/8	+1.78
Planning Research	36 1/2	21	286	26 1/4	21	22 1/2	+1 1/4	+5.88
Potter Instrument	26 3/8	14 5/8	419	18 1/4	16	16 3/4	-1/2	-2.90
AMEX COMPUTER STOCK AVERAGE							+0.28	+1.78

OVER-THE-COUNTER	1966 High Bid	1966 Low Bid	July 1 Bid	July 1 Asked	3 weeks ago Bid
C-E-I-R	15 1/4	8 7/8	10 1/4	10 5/8	11 1/8
Computer Control	25 1/2	14	23 1/2	24	22
Computer Usage	24 1/2	17 3/4	20 1/4	22 1/4	22 1/2
Digitronics	12 3/4	7 7/8	9 3/8	9 3/4	8 3/4
Management Assistance	45 3/4	30 1/4	34 1/2	35	34 1/2
Scientific Data	74 1/2	44	52 3/4	52 7/8	57 1/2
Data Products	4	2 3/8	3 1/4	3 3/4	3 1/8
Fabri-Tek	26	8 7/8	11 1/2	12	8 7/8
Memorex	54 3/4	31 1/2	52 1/4	53	51
Mohawk Data Sciences	34 3/4	19	32 1/2	35	28 3/4

Sperry Rand Corporation earned $31,859,232 (or $1.02 a share) on sales of $1.279 million for the fiscal year ended March 31, 1966, contrasted with $22,016,961 (or 70¢ a share) on sales of $1.247 million for 1965. For the first time, the Univac Division was "solidly profitable" for the year. A profit was realized in each of the last five months of the fiscal year, the firm reports.

Earnings for the first quarter ending June 30, 1966 are reported as $13,678,000 (or 44¢ per share) on sales of $356,348,000. During the same 1965 period, earnings were $4,450,000 (14¢ per share) on sales of $271,792,000. (Sales for the first quarter 1965 were depressed because of a 38 day strike at one of the plants).

University Computing Company, Dallas Tex., has filed a statement with the SEC to register 100,000 shares of common stock and $2.5 million of debentures through underwriters headed by A. G. Edwards & Sons, St. Louis, Mo. The firm will use the proceeds to expand its EDP equipment and professional services.

July 28, 1966 Vol. 2, No. 7

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E|D|P
INDUSTRY AND
MARKET REPORT

A SEMI-MONTHLY NEWSLETTER FOR EXECUTIVES
IN THE ELECTRONIC DATA PROCESSING INDUSTRY,
AND THE FINANCIAL COMMUNITY.

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INCOME REQUIREMENTS TO SUPPORT HEAVY 360 MANUFACTURING, INSTALLATION, AND SUPPORT ACTIVITY MAY REQUIRE IBM TO ACCELERATE PURCHASES BY CUSTOMERS DURING NEXT EIGHTEEN MONTHS

For the six months ended this past June 30th, IBM's worldwide consolidated sales increased 15.9% to $1,993 million. However, the cost of IBM's sales, service and rental income increased 18.2% to $1,450 million.

Although slight at present, this gap between the gain in income and the gain in expenses can be expected to widen sharply during the next 18 months. . .under current IBM marketing policy. This is the period of most rapid increase in production and delivery schedules for IBM's 360 computer line. The heavy cash outlays needed to support this activity can create a rather unusual problem for IBM: shortage of a comfortable supply of cash assets.

IBM is blessed with an "over quota" backlog of 360 orders. This gives IBM a flexible position from which to alter their marketing policy to increase income and/or reduce expenses during the next 18 months. What form might such a policy change take? There are several possible ones. For example:

1) IBM can delay and/or space out deliveries of 360's to customers, thereby lessening intensity of production and service expenses, while at the same time extending the revenue producing life of second-generation computers already installed and marked for replacement by 360's at customer sites. However, competitive pressures and customer goodwill should make any strong or obvious move in this direction unlikely.

2) IBM can promote the use of longer fixed term leases (for example, three or five years) in leasing computers to customers. These leases could then be sold to financial institutions to generate additional capital. This step is also unlikely because IBM's sales success is heavily based upon year-by-year increases in the value of IBM equipment installed at a customer site. Fixed term lease contracts tend to inhibit this customer growth by making computer peripheral equipment exchanges less practical. Also, the current tight money market has put a premium fee on the availability of such funds.

3) IBM could promote a sell-off of second-generation equipment currently on rent to customers by sharply reducing its purchase price. Although this move could generate a sharp increase in income, its competitive impact upon future 360 sales, as well as the adverse effect it could have on IBM's key asset, its sales staff, makes aggressive action in this direction unlikely.

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4) IBM could reduce the purchase-to-rent ratio on 360 equipment. This would shorten the number of months of rental payments that would sum up to the purchase cost of the computer system...and taking into account maintenance and interest costs, shorten the period of continuous computer use before the breakeven point is reached, i.e., it is more economical to purchase rather than rent the new computer system. This move would increase the percentage of customers likely to purchase their 360 equipment upon initial acquisition. It would also stimulate the activity of purchase-leaseback firms working with third-generation computer equipment.

Our analysis indicates that IBM may well take the latter course. Here's why: Currently about 93-94% of 360 customers are renting their equipment. As the table below indicates, 360 equipment shipped during '66 would generate approximately $270 million additional income during this year. However, IBM's direct materials and shipping costs (estimated at 20% of the $2.5 billion worth of 360's to be shipped in '66) will be approximately $500 million. To balance these figures, we estimate that IBM must strive to reduce its computer rentals to 85-86% of shipments. . .by comparison, about 80% of second-generation IBM computers are now rented.

To achieve this, reduction of 5-8% in the purchase-to-rent ratio of 360's would probably be required. (Current ratio is approximately 50-to-1). This result can be obtained by a reduction in the purchase price of 360 equipment and/or an increase in the rental cost. If any step is taken, a decrease in the purchase price is almost surely to be a part of the scheme. . .IBM's purchase-to-rent ratio is already approximately 10-15% higher than its major competitors. An increase in the rental price, although a step rarely taken by IBM, would not only lower the purchase-to-rent ratio but also increase the revenue producing power of installed rental equipment and thin out the 360 backlog somewhat.

Industry observers expect a marketing policy change from IBM in this area by early fall.

ESTIMATED INCOME FROM
IBM 360 COMPUTER SHIPMENTS
(IN $ MILLIONS)

	1966	1967
Estimated Gross Value of Equipment Shipped	$2500	$3000
Net Monthly Rental Increase of Equipment Shipped (37% of gross ÷ 50)	$19	$22
Income Increase from 360's Shipped during Year if:		
95% on Rent	$233	$275
90% on Rent	$353	$419
85% on Rent	$472	$562
80% on Rent	$591	$706

NEWS BYTES

GENERAL ELECTRIC has picked up an interesting EDP order from the Internal Revenue Service. The order is for a system to replace IBM card punches and verifiers. It consists of a GE/PAC 4060 process control computer, a disc storage unit, magnetic tape drives, and GE 760 visual display terminals. Half the terminals will be supplied with a new keypunch keyboard used to stroke in source data from tax returns. The tax data, after being verified for consistency by the computer, is put directly on magnetic tape. If an error is made in keypunching, lights blink on the 760 display screen so that the operator can make an immediate correction. GE's Federal Systems Operation, which sold the order, combined units from several GE organizations to create the system. Interestingly, the computer itself is from GE's Process Control Business Section in Phoenix, Ariz., not its Computer Equipment Department there. The latter is producing the disc storage unit and magnetic tape drives. The Datanet-760 terminals will be produced in GE's Oklahoma City computer operation. The system is considered a pilot version. If successful, six other IRS data centers may order similar equipment.

Requests for bids on a new data transcription system were issued by IRS in December, 1965, to 60 companies in the data processing field. Ten proposals were received in April, 1966, and following evaluation by IRS technicians, the G-E proposal was selected for the trial installation.

CONTROL DATA's common stock continued under heavy selling pressure during the spring as a group of discontented officers and directors "bailed out" of substantial parts of their holdings (32% on a cumulative basis). The value of 45,888 shares sold during the period, as reported in the July '66 SEC Official Summary of "insider transactions", was worth in excess of $1.5 million. Significantly, not a single share of Control Data was reported bought by an "insider" during the same period. Here is the roster of the selling activity.

CDC "Insider"	Period	No. of Common Shares Bought	Sold	Month End Holdings
Seymour R. Cray	4/1/66			
Vice President	to			
and Director	6/10/66	0	6000	16,000
Wife and children	6/15/66	0	2900	4,000
George S. Hanson	4/1/66			
Vice President	to			
	6/23/66	0	2400	3,555
William R. Keye	4/1/66			
Vice President	to			
	6/10/66	0	2300	19,864
Edward D. Zimmer	4/12/66			
Vice President	to			
	6/10/66	0	3000	9,104
William G. Andrews				
Director	3/17/66	0	300	12,400
Wife	4/20/66	0	488	0
Gene B. Heywood				
Director	6/3/66	0	1000	5,000
Frank C. Mullaney	4/1/66			
Director	to			
	6/13/66	0	28,500	23,748
Wife	6/17/66	0	1000	6,032
As Guardian	4/5/66		100	3,631

Con't on page 8 . . .

IBM HAD 73.7% OF $8.2 BILLION DOMESTIC COMPUTER MARKET AT END OF 1965; UNIVAC, CONTROL DATA HELD PLACE AND SHOW POSITIONS.

IBM's share of the total U. S. computer market declined just over a percentage point during 1965, dropping from 75% to 73.7% by year end. This is one of the findings in a study of the U. S. computer market made by our staff during the first half of this year. The study was based upon a statistical analysis of a Computer Installation Census File compiled during the past two years by our firm. This census file identifies on a current basis the users of nearly 85% of digital computer installations in the United States. The figures generated in the study have been extrapolated to cover the entire domestic market.

Univac held second place in the U. S. computer market with a 6.6% share at the end of '65, Control Data held third place with 4.5%, followed by Burroughs with 3.14% and Honeywell with 3.07%. RCA, General Electric, and NCR followed in that order.

The study also determined that durable products manufacturing (SIC groups 19, 32-29) was the largest domestic market for computers, using 22.2% of the value of installed computer systems in the country. Federal, state, and local government followed with 19.8%. Financial institutions were third with 17.8%.

IBM's largest percentage shares of the computer market are in mining and contract construction where it enjoys 88.5% of the business, and in utilities where it has 84%. IBM's weakest market share is in the government area, largely due to the reduced share of the Federal Government market it has been getting in recent years. IBM's share of the Federal market for commercial systems dropped from 54% in 1964 to 46% by the end of '65.

Table 1 gives a summary of the results of this study. Below is a definition of the S.I.C. (Standard Industrial Classification) market codes used in this study.

Industry or Activity	S.I.C. Group
Agriculture, Forestry, and Fisheries	01 - 09
Mining and Contract Construction	10 - 17
Chemical and Natural Product Processing including Food, Tobacco, Textiles, Woods, Wood Products, Paper, Publishing, Rubber and Leather Products	20 - 31
Durable Products Manufacturing including Stone and Glass Products, Primary Metals Industries, Fabricated Metal Products, Machinery, Transportation Equipment, Scientific and Professional Apparatus Ordnance Equipment	19, 32 - 39
Transportation, Communication and Other Public Utilities	40 - 49
Wholesale and Retail Trades	50 - 59
Finance, Insurance and Real Estate	60 - 69
Business and other Non-Professional Services	70 - 79
Medical, Educational and Other Professional Services	80 - 89
Federal, State, City and Local Government	90 - 99

TABLE 1.

SHARE OF THE U. S. COMPUTER MARKET BY INDUSTRY GROUP
% BY MANUFACTURER; FIGURES IN $MILLIONS
COVERS INSTALLED GENERAL PURPOSE DIGITAL COMPUTERS

S.I.C. / Manuf. Group	01-09	10-18	20-31	32-39	40-49	50-59	60-69	70-79	80-89	90-99	Total Value of Installed Sys.	% of Total Market
Burroughs	0.6%	1.9%	1.6%	2.0%	0.7%	1.3%	8.2%	3.3%	4.0%	1.9%	$259.0	3.14%
Control Data	<0.1%	2.8%	1.8%	5.2%	0.2%	<0.1%	<0.1%	6.0%	9.1%	9.9%	372.8	4.53
General Electric	<0.1%	0.2%	1.1%	3.1%	0.6%	<0.1%	4.3%	2.3%	1.2%	1.7%	182.2	2.21
Honeywell	6.1%	0.8%	3.2%	3.0%	2.3%	5.0%	3.3%	4.4%	1.9%	3.0%	253.2	3.07
IBM	80.4%	88.5%	80.4%	72.2%	84.1%	80.9%	72.3%	71.6%	76.1%	65.0%	6,063.2	73.67
NCR	7.4%	1.1%	2.0%	1.5%	0.4%	4.6%	4.5%	2.5%	0.8%	2.4%	190.1	2.31
RCA	<0.1%	0.6%	2.5%	2.5%	5.3%	1.0%	3.2%	1.0%	0.2%	4.5%	235.4	2.86
Sperry Rand Univac	5.5%	3.1%	6.2%	8.3%	5.6%	6.9%	4.1%	5.6%	4.6%	8.9%	540.4	6.57
Others	<0.1%	1.0%	1.2%	2.2%	0.8%	0.1%	<0.1%	3.3%	2.1%	2.7%	135.0	1.64
Total Value of Installed Computers	$9	$195	$817	$1824	$674	$381	$1461	$576	$662	$1632	$8,231.1	
% of Total Market	<0.1%	2.4%	9.9%	22.2%	8.2%	4.6%	17.8%	7.0%	8.0%	19.8%		100%

Source: Computer Installation Data File of International Data Corporation, Newton, Mass. 02160

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MONTHLY COMPUTER CENSUS

The number of electronic digital computers installed or in production at any one time has been increasing at a bewildering pace in the past several years. New vendors have come into the market, and familiar machines have gone out of production. Some machines have been received with open arms by users -- others have been given the cold shoulder.

To aid readers of the EDP I&MR in keeping with this mushrooming activity, we compile and publish this monthly report on the number of general purpose electronic computers made by American-based companies which are installed or on order as of the preceding month. These figures included installations and orders outside the United States. We update this computer census monthly, so that it will serve as a "box score" of progress in following the growth of the American computer industry, and of the computing power it builds.

In general, manufacturers in the computer field do not officially release installation and on order figures. The figures in this table are developed through a continuing market survey conducted by our research staff. This market research program develops a documented data file on over 80% of the computer installations in the United States. A similar program is conducted for overseas installations.

Comments on this census from informed readers will be welcomed.

AS OF JUNE 10, 1966

	NAME OF COMPUTER	SOLID STATE?	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS	NUMBER OF UNFILLED ORDERS
Advanced Scientific Instruments	ASI 210	Y	$3850	4/62	25	0
	ASI 2100	Y	$4200	12/63	7	0
	ADVANCE 6020	Y	$4400	4/65	9	5
	ADVANCE 6040	Y	$5600	7/65	4	5
	ADVANCE 6050	Y	$9000	2/66	2	6
	ADVANCE 6070	Y	$15,000	10/65	2	6
	ADVANCE 6130	Y	$1000	11/66	0	3
Autonetics	RECOMP II	Y	$2495	11/58	42	X
	RECOMP III	Y	$1495	6/61	10	X
Bunker-Ramo Corp.	BR-130	Y	$2000	10/61	160	4
	BR-133	Y	$2400	5/64	20	3
	BR-230	Y	$2680	8/63	15	X
	BR-300	Y	$3000	3/59	36	X
	BR-330	Y	$4000	12/60	34	X
	BR-340	Y	$7000	12/63	20	X
Burroughs	205	N	$4600	1/54	49	X
	220	N	$14,000	10/58	40	X
	E101-103	N	$875	1/56	142	X
	B100	Y	$2800	8/64	145	20
	B250	Y	$4200	11/61	95	4
	B260	Y	$3750	11/62	224	8
	B270	Y	$7000	7/62	153	12
	B280	Y	$6500	7/62	128	15
	B300	Y	$8400	7/65	79	90
	E2500	Y	$5000	1/67	0	26
	B3500	Y	$14,000	5/67	0	20
	B5500	Y	$22,000	3/63	51	10
	B6500	Y	$33,000	2/68	0	2
	B8500	Y	$200,000	2/67	0	1
Computer Control Co.	DDP-24	Y	$2500	5/63	70	8
	DDP-116	Y	$900	4/65	58	30
	DDP-124	Y	$2050	3/66	16	18
	DDP-224	Y	$3300	3/65	25	20
Control Data Corporation	G-15	N	$1600	7/55	310	X
	G-20	Y	$15,500	4/61	23	X
	LGP-21	Y	$725	12/62	120	X
	LGP-30	semi	$1300	9/56	125	X
	RPC-4000	Y	$1875	1/61	55	X
	160*/160A/160G	Y	$1750/$4000/$12,000	5/60;7/61;3/64	450	5
	924/924A	Y	$11,000	8/61	29	X
	1604/1604A	Y	$45,000	1/60	59	X
	1700	Y	$4000	5/66	6	80
	3100	Y	$7500	12/64	74	35
	3200	Y	$12,000	5/64	90	X
	3300	Y	$15,000	9/65	12	40
	3400	Y	$25,000	11/64	19	X
	3500	Y	$30,000	9/66	0	10
	3600	Y	$58,000	6/63	50	2
	3800	Y	$60,000	2/66	3	12
	6400	Y	$50,000	5/66	2	14
	6600	Y	$85,000	8/64	14	9
	6800	Y	$130,000	4/67	0	4
Data Machines, Inc.	620	Y	$900	11/65	6	32
Digital Equipment Corp.	PDP-1	Y	$3400	11/60	60	X
	PDP-4	Y	$1700	8/62	55	2
	PDP-5	Y	$900	9/63	112	1
	PDP-6	Y	$10,000	10/64	19	4
	PDP-7	Y	$1300	11/64	69	50
	PDP-8	Y	$525	4/65	290	275
El-tronics, Inc.	ALWAC IIIE	N	$1820	2/54	20	X
Electronic Associates, Inc.	8400	Y	$7000	6/65	4	6
Friden	6010	Y	$600	6/63	420	80
General Electric	115	Y	$1375	12/65	90	520
	205	Y	$2900	6/64	46	X
	210	Y	$16,000	7/59	50	X
	215	Y	$6000	9/63	56	X
	225	Y	$8000	4/61	214	X
	235	Y	$10,900	4/64	62	5
	415	Y	$7300	5/64	155	72
	425	Y	$9600	6/64	63	46
	435	Y	$14,000	10/64	27	18
	625	Y	$45,000	12/64	15	28
	635/645	Y	$55,000	12/64	9	31
Honeywell Electronic Data Processing	H-120	Y	$2600	1/66	90	300
	H-200	Y	$5700	3/64	770	110
	H-400	Y	$8500	12/61	120	X
	H-800	Y	$22,000	12/60	86	3
	H-1200	Y	$7300	2/66	8	50
	H-1400	Y	$14,000	1/64	12	1

NAME OF MANUFACTURER	NAME OF COMPUTER	SOLID STATE?	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS	NUMBER OF UNFILLED ORDERS
Honeywell (cont'd)	H-1800	Y	$35,000	1/64	19	4
	H-2200	Y	$13,000	1/66	8	46
	H-4200	Y	$20,500	3/67	0	9
	H-8200	Y	$35,000	3/68	0	3
	DATAmatic 1000	N	$40,000	12/57	4	X
IBM	305	N	$3600	12/57	160	X
	360/20	Y	$1800	12/65	200	6500
	360/30	Y	$7500	5/65	1200	4200
	360/40	Y	$15,000	4/65	740	1700
	360/44	Y	$10,000	9/66	0	500
	360/50	Y	$26,000	8/65	44	650
	360/62	Y	$55,000	11/65	1	X
	360/65	Y	$50,000	11/65	10	110
	360/67	Y	$75,000	9/66	0	55
	360/75	Y	$78,000	2/66	5	45
	360/90 Series	Y	$140,000	6/67	0	9
	650	N	$4800	11/54	220	X
	1130	Y	$1200	11/65	275	3700
	1401	Y	$6600	9/60	6600	300
	1401-G	Y	$1900	5/64	1550	60
	1410	Y	$14,200	11/61	775	110
	1440	Y	$4800	4/63	3050	425
	1460	Y	$9000	10/63	2000	130
	1620 I, II	Y	$4000	9/60	1700	50
	1800	Y	$7600	1/66	15	275
	701	N	$5000	4/53	1	X
	7010	Y	$22,600	10/63	195	30
	702	N	$6900	2/55	7	X
	7030	Y	$160,000	5/61	6	X
	704	N	$32,000	12/55	36	X
	7040	Y	$22,000	6/63	118	12
	7044	Y	$32,000	6/63	130	18
	705	N	$38,000	11/55	58	X
	7070, 2, 4	Y	$27,000	3/60	335	X
	7080	Y	$55,000	8/61	80	X
	709	N	$40,000	8/58	11	X
	7090	Y	$63,500	11/59	45	1
	7094	Y	$72,500	9/62	122	4
	7094 II	Y	$78,500	4/64	124	10
Monroe Calculating Machine Co.	Monrobot XI	Y	$700	12/60	500	100
National Cash Register Co.	NCR - 304	Y	$14,000	1/60	26	X
	NCR - 310	Y	$2500	5/61	20	X
	NCR - 315	Y	$8500	5/62	400	30
	NCR - 315-RMC	Y	$12,000	9/65	35	75
	NCR - 390	Y	$1850	5/61	1000	55
	NCR - 500	Y	$1500	10/65	325	700
Philco	1000	Y	$7010	6/63	20	X
	2000-210, 211	Y	$40,000	10/58	18	X
	2000-212	Y	$52,000	1/63	11	X
Radio Corporation of America	Bizmac	N	$100,000	-/56	2	X
	RCA 301	Y	$7000	2/61	647	4
	RCA 3301	Y	$17,000	7/64	50	14
	RCA 501	Y	$14,000	6/59	99	X
	RCA 601	Y	$35,000	11/62	5	X
	Spectra 70/15	Y	$3500	9/65	45	110
	Spectra 70/25	Y	$5000	9/65	25	70
	Spectra 70/35	Y	$9000	11/66	0	70
	Spectra 70/45	Y	$15,000	11/65	8	130
	Spectra 70/55	Y	$30,000	7/66	0	15
Raytheon	250	Y	$1200	12/60	175	2
	440	Y	$3500	3/64	14	3
	520	Y	$3200	10/65	10	6
Scientific Control Systems	650	Y	$500	4/66	0	3
	660	Y	$2000	10/65	3	2
	670	Y	$2600	5/66	1	2
Scientific Data Systems Inc.	SDS-92	Y	$1500	4/65	45	40
	SDS-910	Y	$2000	8/62	175	12
	SDS-920	Y	$2900	9/62	118	10
	SDS-925	Y	$3000	12/64	17	20
	SDS-930	Y	$3400	6/64	112	30
	SDS-940	Y	$10,000	4/66	3	14
	SDS-9300	Y	$7000	11/64	25	8
	Sigma 7	Y	$12,000	12/66	0	20
Systems Engineering Labs	SEL-810	Y	$1000	9/65	20	9
	SEL-840	Y	$1400	11/65	3	4
UNIVAC	I & II	N	$25,000	3/51 & 11/57	28	X
	III	Y	$20,000	8/62	82	1
	File Computers	N	$15,000	8/56	18	X
	Solid-State 80 I, II, 90 I, II & Step	Y	$8000	8/58	270	X
	418	Y	$11,000	6/63	80	40
	490 Series	Y	$35,000	12/61	98	65
	1004	Y	$1900	2/63	3350	120
	1005	Y	$2400	4/66	25	200
	1050	Y	$8000	9/63	290	50
	1100 Series (except 1107)	N	$35,000	12/50	11	X
	1107	Y	$55,000	10/62	30	2
	1108	Y	$65,000	9/65	9	28
	LARC	Y	$135,000	5/60	2	X
					TOTALS 34,124	23,176

X = no longer in production.

* To avoid double counting, note that the Control Data 160 serves as the central processor of the NCR 310. Also, many of the orders for the IBM 7044, 7074, and 7094 I and II's are not for new machines but for conversion from existing 7040, 7070, and 7090 computers respectively.

STOCK MARKET REPORT ON SELECTED EDP FIRMS

July 1 - 22, 1966

	1966 High	1966 Low	3-weeks Sales in 100's	3-weeks High	3-weeks Low	Last	3-weeks Net Change	3-weeks % Change
NEW YORK STOCK EXCHANGE								
Addressograph-Multigraph	77 3/8	54 1/8	5740	71 3/8	61 1/2	64 3/8	+1 3/4	+2.79
American R & D	40 7/8	20 1/4	1610	40 7/8	25 5/8	40 5/8	+15	+58.54
Ampex Corp.	26 3/4	17	10,577	25 3/4	21	25 3/8	+3 7/8	+18.02
Burroughs	85 1/8	49 1/4	7241	85 1/8	71 5/8	84 5/8	+11 5/8	+15.92
Control Data	39 1/4	26 3/8	5753	39 1/4	33 3/8	33 1/2	-2 1/2	-6.94
Electronic Assoc	27 1/8	16 1/8	485	20 3/4	17 5/8	18	-1 3/8	-7.10
General Dynamics	66 1/2	49 1/4	1875	55 3/4	49 1/4	49 7/8	-2 1/2	-4.77
General Electric	120	101 1/8	1778	110 3/4	101 1/8	101 3/8	-4 7/8	-4.59
Honeywell	96	68 1/2	1094	88 3/4	73 1/4	75 5/8	-9 1/8	-10.77
IBM	375	332 1/2	1015	361 1/2	349 1/2	354 1/2	---	---
Inter. Tel & Tel	79 3/8	65 3/4	1524	79 3/8	75	75 1/8	-1/4	-0.33
Litton	86 1/2	66 1/2	1401	80	72 3/4	75 3/8	-1 1/4	-1.63
Nat. Cash Register	91 1/2	76	886	85	82 1/2	83 3/4	-1/2	-0.59
RCA	62 1/4	46 1/8	4358	51 7/8	48 1/2	48 5/8	-1 5/8	-3.23
Raytheon	55 1/8	36	1903	47	42 1/4	42 5/8	-1 7/8	-4.19
SCM	91 7/8	47 1/4	6524	84	72 3/8	72 3/8	-7	-8.82
Singer	64 3/4	49 3/4	1075	53 1/4	49 3/4	49 7/8	-2 1/4	-4.32
Sperry Rand	30 5/8	17 1/8	19,398	30 5/8	26 1/2	30 1/4	+2 3/8	+8.52
Teledyne	133	87	2255	125	113 1/4	113 1/2	-3 3/4	-3.20
NYSE COMPUTER STOCK AVERAGE							-0.22	+2.28
AMERICAN STOCK EXCHANGE								
ANelex	28	14 5/8	234	17 3/4	14 5/8	15 1/4	-1 1/2	-8.96
Bunker-Ramo	10 1/2	7 1/4	2401	10 1/2	9	9 3/8	+7/8	+10.29
Cal Comp	25 7/8	13 1/4	193	23 5/8	22 1/2	23 1/2	+1/2	+ 2.17
Clary	8	4 5/8	124	6	5 1/4	5 1/4	-1/2	-8.70
Computer Application	26 1/4	16 3/4	158	19 3/4	17 3/4	17 3/4	---	---
Computer Science	37 1/4	19 1/8	1002	35 1/4	31 5/8	33 1/4	-5/8	-1.84
Milgo Elect.	8 7/8	6 3/4	57	7 1/8	6 3/4	7	-1/8	-1.75
Planning Res.	36 1/2	21	99	25 1/4	22	23 1/2	+1	+4.44
Potter Instrument	26 3/8	14 5/8	235	18	16 1/4	16 1/2	-1/4	-1.49
AMEX COMPUTER STOCK AVERAGE							-0.07	-0.65

	1966 High Bid	1966 Low Bid	July 22 Bid	July 22 Asked	3 weeks ago Bid
OVER-THE-COUNTER					
C-E-I-R	15 1/4	8 7/8	10 3/8	10 3/4	10 1/4
Computer Usage	24 1/2	17 3/4	20 3/4	22 3/4	20 1/4
Data Products	4	2 3/8	3 1/2	4	3 1/4
Digitronics	12 3/4	7 7/8	8 3/8	8 7/8	9 3/8
Electronic Memories	26	22 5/8	23	23 1/2	22 1/8
Fabri-Tek	26	8 7/8	13 7/8	14 1/4	11 1/2
Management Assistance	45 3/4	30 1/4	33 1/8	33 5/8	34 1/2
Memorex	57 3/4	31 1/2	57 1/4	58 1/4	52 1/4
Mohawk Data Sciences	46	19	46	49 1/2	32 1/2
Scientific Data	74 1/2	44	62 3/4	63 3/4	52 3/4

NEWS BYTES . . . con't from page 5.

POTTER INSTRUMENT's common stock has also been under selling pressure from insiders this past spring. Daniel J. Webster, a vice president and director, sold 20,800 shares during April '66 reducing his holdings to 6600. Electronics Capital Corp., an investment corporation that had owned more than 10% of the outstanding common shares of Potter, sold 58,042 shares during May '66 reducing its holdings to 158,159, or 7% of the outstanding shares. Market price of Potter's common has declined from a high of 26 3/8 this past April to 16 1/2 currently.

SYSTEMS ENGINEERING LABORATORIES, INC., a recent entry into the digital computer field, reports sales of over $6 million for its fiscal year ended June 24th, an increase of 14% over the $5.25 million reported last year. SEL president, A.G. Randolph, says that backlog at the end of the fiscal year was over $3.8 million. Mr. Randolph revealed that SEL's entry into the digital computer field with the model 810 and 840 processors contributed substantially to the increase in sales volume over the previous year. Most of the large custom systems now produced by SEL include a digital computer as a major component. About 50% of its backlog is from industrial customers.

August 18, 1966 Vol 2, No. 8

SPECIAL FEATURE THIS ISSUE:
Monthly Computer Census. . . . . Page 6

E|D|P
INDUSTRY AND MARKET REPORT

A SEMI-MONTHLY NEWSLETTER FOR EXECUTIVES IN THE ELECTRONIC DATA PROCESSING INDUSTRY, AND THE FINANCIAL COMMUNITY.

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LATEST GOVERNMENT COMPUTER INVENTORY SHOWS OVER $1.5 BILLION WORTH OF SYSTEMS IN USE; IBM MAINTAINS OVER HALF THE MARKET, CONTROL DATA AND UNIVAC GAIN

The Federal Government, the world's largest computer user, has just released its fourth annual inventory of computer equipment. The Inventory of Automatic Data Processing Equipment in the Federal Government, compiled by the Bureau of the Budget, indicates that nearly 11% of the digital computer systems in use in the United States are owned or rented by Uncle Sam.

This year's inventory includes for the first time card-oriented computers. It also includes a special listing of special purpose computer systems in use by the government. The inventory includes computers in use by government agencies and also those operated by government contractors under cost reimbursement-type contracts when equipment is furnished to the contractor by the government or when the equipment is installed in a government-owned, contractor-operated facility. The inventory does not include computers used in military operations or in certain classified activities.

Among the significant statistics provided by this publication on the government's use of general purpose digital computers are:

* 2623 computers were in use in the Federal Government by June 1966, up from 2160 a year ago. This number is expected to decline slightly to 2600 by June 1967. However, such predictions on the number of computers in Federal Government have been made systematically during the past four years, but they have never been correct. There are now 45 agencies in the Executive Branch of the Federal Government which use ADP equipment. By June 1966 39 of these had computers installed and 6 used only punched card equipment.

* The number of locations where computers are installed in the Federal Government increased to 1141 as of June 1966, up from 962 a year ago. By June 1967 the number of installation sites is expected to increase to 1243.

* Computer rental charges amounted to $206 million in the fiscal year ended June 30, 1966. This compares with $187 million in the fiscal year ended June 30, 1965. During the current fiscal year computer rental costs are expected to increase to $237 million. In comparison, punched card equipment rentals are expected to decline from $38 million in the fiscal year ended June 1966 to $37 million during the current fiscal year.

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* The government spent $139 million purchasing ADP equipment during the fiscal year ended June 1966. At that time 44.9% of all computers in use had been purchased. During the current fiscal year the government expects to spend $144 million to purchase additional computers, bringing the percentage of the government's computers owned to 48.7% by June 1967.

* Total cost for ADP equipment and services for the Federal Government was $1182 million during the fiscal year ended June 1966. This is expected to increase to $1292 million during the current fiscal year. The major cost item in these charges was for personnel: $465 million during the fiscal year ended June 1966, and $515 million during the current fiscal year.

* The government found plenty of work for its computers to do, apparently. On the average, computers were used 330 hours per month, representing nearly two full work shifts each working day.

EDP I&MR has made an analysis of the share of the government market obtained by the principal computer manufacturers by analyzing the number and sales value of general and special purpose digital computers listed in the current Bureau of the Budget inventory. This analysis indicates that, as of June 30, 1966, IBM maintained 54.0% of the government market in terms of equipment value, although only 34.9% in terms of the number of systems. Control Data was in second place, with 14.4% by value, and 11.4% by number. Next came Univac, with 13.2% by value, and 19.9% by number. The estimates in the inventory indicate that IBM's share of the federal market will drop to 50.8% by value as of the end of June 1967. At that time Control Data is expected to retain second place in the federal market with 15.2% of the value of equipment installed. The table below provides a summary of the analysis which led to these figures. The estimates of the sales value for each computer model were obtained by EDP I&MR from an analysis of the purchase cost range figures provided in the inventory, supplemented with system configuration statistics maintained by our staff.

ANALYSIS OF DIGITAL COMPUTERS IN THE SERVICE OF THE FEDERAL GOVERNMENT

Name of Manufacturer	Manufacturer	Model	No. of Systems as of 12-31-65	Value of Systems as of 12-31-65 ($1000's)	No. of Systems as of 6-30-66	Value of Systems as of 6-30-66 ($1000's)	No. of Systems as of 6-30-67	Value of Systems as of 6-30-67 ($1000's)
Advanced Scientific Instruments		210	6	980	4	800	4	880
		2100	2	470	2	490	2	510
		6020	--	--	1	180	2	360
		Subtotal	8	1450	7	1470	8	1750
	% of Total		.3%	.1%	.2%	.1%	.3%	.1%
Autonetics NAA		RECOMP II	19	2050	18	1980	17	1870
		Subtotal	19	2050	18	1980	17	1870
	% of Total		.7%	.1%	.6%	.1%	.6%	.1%
Bunker-Ramo Corp.		130	5	420	5	420	5	420
		230	1	280	1	280	--	--
		340	1	300	1	300	1	300
		400	1	2100	1	2100	--	--
		Subtotal	8	3100	8	3100	6	720
	% of Total		.3%	.2%	.3%	.2%	.2%	< .1%
Burroughs		160	2	380	2	380	2	380
		204	2	450	1	260	1	260
		205	1	202	-	--	-	--
		220	2	1600	1	900	-	--
		250	2	370	2	370	2	370
		263	135	22275	149	24585	153	25245
		280	3	660	3	660	2	440
		283	4	1120	4	1120	4	1120
		E101	5	200	5	200	4	160
		E102	1	42	1	42	1	42
		5000	1	900	1	900	1	900
		5500	5	6950	5	6950	5	6950
		Subtotal	163	35,149	174	36,367	175	35,867
	% of Total		6.0%	2.5%	5.8%	2.	6.0%	2.4%

Name of Manufacturer	Model	No. of Systems as of 12-31-65	Value of Systems as of 12-31-65 ($1000's)	No. of Systems as of 6-30-66	Value of Systems as of 6-30-66 ($1000's)	No. of Systems as of 6-30-67	Value of Systems as of 6-30-67 ($1000's)
Control Data Corporation	160	13	1800	13	1800	13	1800
	160A	101	29,920	98	29,930	96	28,530
	160G	24	8400	30	10,500	38	13,300
	636	2	640	2	640	2	640
	924	7	4500	7	4500	7	4500
	924A	1	460	1	460	1	460
	1604,A,B	27	41,000	28	42,560	27	41,000
	3100	12	4800	22	8800	22	8800
	3200	20	11,300	20	11,300	21	11,865
	3400	1	1050	2	2100	3	3150
	3600	21	57,750	20	55,000	18	49,500
	3800	--	---	2	6000	2	6400
	4000	7	700	6	600	5	500
	6600	3	16,000	10	47,500	11	52,000
	8090	9	1235	19	2140	19	2140
	G15	32	2176	28	1904	24	1632
	G15D	4	269	4	269	3	202
	G20	1	650	1	650	-	--
	LG21	4	122	3	91	3	91
	LG30	25	1500	25	1500	23	1380
	Subtotal	214	184,272	341	227,544	338	227,890
	% of Total	11.5%	12.9%	11.4%	14.4%	11.6%	15.2%
Data Machines, Inc.	620	1	55	2	110	2	120
	Subtotal	1	55	2	110	2	120
	% of Total	< .1%	< .1%	< .1%	< .1%	< .1%	< .1%
Digital Equipment Corp.	PDP1	15	3450	14	3230	12	2800
	PDP4	8	720	9	810	9	810
	PDP5	16	720	16	720	16	720
	PDP6	3	1400	6	2900	7	3300
	PDP7	12	720	14	840	14	840
	PDP8	5	110	13	312	19	475
	LINC	1	120	1	120	1	120
	Subtotal	60	7240	73	8932	78	9065
	% of Total	2.2%	.5%	2.4%	.6%	2.7%	.6%
Electronic Associates, Inc.	8400	1	350	3	1250	5	1950
	PDS1020	2	36	4	72	4	72
	Subtotal	3	386	7	1322	9	2022
	% of Total	.1%	< 1%	.2%	< .1%	.3%	.1%
El-tronics, Inc.	ALW3	5	650	4	520	4	520
	Subtotal	5	650	4	520	4	520
	% of Total	.2%	< .1%	.1%	< .1%	.1%	< .1%
Friden	6010	7	168	7	168	7	168
	Subtotal	7	168	7	168	7	168
	% of Total	.3%	< .1%	.2%	< .1%	.2%	< .1%
General Electric	205	6	780	6	780	6	780
	215	6	1580	5	1320	2	528
	225	26	9152	24	8448	20	7040
	235	11	7700	9	6300	9	6300
	312	1	190	1	190	1	190
	412	5	1400	6	1680	8	2240
	415	3	1180	3	1190	4	1800
	425	1	800	3	2400	10	8000
	625	1	2000	1	2000	1	2000
	635	1	3500	1	3500	2	7000
	Subtotal	61	28,282	59	27,808	63	35,878
	% of Total	2.2%	2.0%	2.0%	1.8%	2.2%	2.4%
General Precision	3055	--	--	--	--	1	3500
	Subtotal	--	--	--	--	1	3500
	% of Total	0%	0%	0%	0%	< .1%	.2%
Honeywell Electronic Data Proc.	200	63	17,200	72	20,000	73	21,400
	400	9	4050	9	4050	7	3150
	610, 620	3	900	3	900	3	900
	800	25	23,750	27	26,730	24	23,760
	1800	3	4850	3	4850	--	--
	2200	--	--	--	--	1	585
	DDP24	19	3325	21	3675	21	3675
	DDP116	1	80	1	80	2	160
	DDP124	--	--	--	--	2	170
	DDP224	2	500	8	2000	11	2750
	Subtotal	125	54,655	144	62,285	144	56,550
	% of Total	4.6%	3.8%	4.8%	4.0%	5.0%	3.8%
IBM	305	73	12,877	31	5468	7	1235
	360/20	--	--	6	540	11	1000
	360/30	17	7480	53	23,320	56	24,640
	360/40	8	5880	12	8820	22	16,170
	360/50	3	3822	7	8918	7	8918
	360/65	2	4900	6	14,700	11	26,950
	360/67	--	--	1	3675	3	11,025
	360/75	--	--	5	19,110	6	22,932
	360/91	--	--	--	--	1	7000
	360/95	--	--	--	--	1	7000
	610	1	49	--	--	--	--
	650	6	1411	5	1176	3	706
	704	10	15,680	8	12,544	4	6272
	705	3	5586	3	5586	2	3724
	1130	--	--	7	434	10	620
	1401	456	147,290	413	133,400	311	100,450
	1401G	47	4376	48	4469	41	3817
	1410	85	60,000	83	58,000	68	47,000
	1440	25	5600	27	6200	26	6000
	1460	40	16,800	36	14,900	28	12,000

Name of Manufacturer	Model	No. of Systems as of 12-31-65	Value of Systems as of 12-31-65 ($1000's)	No. of Systems as of 6-30-66	Value of Systems as of 6-30-66 ($1000's)	No. of Systems as of 6-30-67	Value of Systems as of 6-30-67 ($1000's)
IBM (cont'd)	1620	107	20,972	88	17,248	67	13,132
	1800	--	--	2	540	7	1960
	7010	22	33,000	26	39,000	22	33,000
	7030	4	20,000	4	20,000	4	20,000
	7040	21	23,000	21	23,000	16	17,500
	7044	17	39,100	18	41,400	16	36,800
	7070	4	4000	3	3000	1	1000
	7074	18	23,814	17	22,491	13	17,199
	7080	26	70,070	29	78,155	26	70,070
	7090	17	52,895	17	52,895	15	46,672
	7094I	29	103,022	27	95,917	27	95,917
	7094II	33	126,934	33	126,934	23	88,469
	7740	4	1800	5	2250	3	1350
	9020	--	--	2	7000	4	9000
	Subtotal	1078	810,358	1043	851,090	862	759,528
	% of Total	39.4%	56.8%	34.9%	54.0%	29.7%	50.8%
International Tel & Tel	7300	3	1800	3	1800	4	4300
	Subtotal	3	1800	3	1800	4	4300
	% of Total	.1%	.1%	.1%	.1%	.1%	.3%
Monroe Calculating Machine Co.	XI	11	330	10	300	9	270
	Subtotal	11	330	10	300	9	270
	% of Total	.4%	<.1%	.3%	<.1%	.3%	<.1%
National Cash Register Co.	102A	1	150	--	--	--	--
	304	6	4800	4	3200	4	3200
	315	10	4500	10	4500	10	4500
	390	173	16,400	169	16,060	166	15,770
	395	5	154	5	154	5	154
	Subtotal	195	26,004	188	23,914	185	23,624
	% of Total	7.1%	1.8%	6.3%	1.5%	6.4%	1.6%
Philco	1000	5	1800	5	2250	4	1720
	2000	7	13,860	7	13,860	6	11,880
	2400	1	120	1	120	--	--
	Subtotal	13	15,780	13	16,230	10	13,600
	% of Total	.5%	1.1%	.4%	1.0%	.3%	1.0%
Raytheon	250	25	1250	25	1250	21	1050
	440	3	690	3	690	3	690
	520	--	--	3	900	3	900
	Subtotal	28	1940	31	2840	27	2640
	% of Total	1.0%	.1%	1.0%	.2%	.9%	.2%
Radio Corporation of America	301	97	38,800	95	38,000	84	33,600
	501	29	19,300	29	19,300	17	11,200
	3301	10	7650	20	15,300	31	23,715
	4101	1	350	1	350	1	350
	Subtotal	137	66,100	145	72,950	133	68,865
	% of Total	5.0%	4.6%	4.9%	4.6%	4.6%	4.6%
Systems Engineering Labs	810	--	--	1	60	2	125
	840	--	--	1	90	1	100
	Subtotal	--	--	2	150	3	225
	% of Total	0%	0%	<.1%	<.1%	.1%	<.1%
Scientific Data Systems, Inc.	92	1	68	2	136	3	204
	910	31	2480	31	2480	34	2720
	920	36	4176	48	5568	56	6500
	925	--	--	3	810	3	810
	930	22	5830	24	6360	29	7685
	9300	3	960	4	1280	6	1920
	Subtotal	93	13,514	112	16,634	131	19,839
	% of Total	3.4%	.9%	3.8%	1.1%	4.5%	1.3%
Sylvania	Mobidic	4	10,000	4	10,000	4	10,000
	Subtotal	4	10,000	4	10,000	4	10,000
	% of Total	.1%	.7%	1%	.6%	.1%	.7%
UNIVAC	418	10	4424	22	9715	27	12,135
	490	11	13,820	12	15,360	10	13,060
	494	--	--	3	1140	5	1900
	642B	10	3400	36	12,240	41	13,950
	1004	197	16,745	163	13,855	155	13,175
	1005	17	1795	104	10,982	126	13,306
	1050	59	20,768	123	43,296	160	56,320
	1102	3	1050	1	350	1	350
	1103	6	9240	5	7700	3	4620
	1105	3	7200	2	4800	1	2400
	1107	11	35,200	10	32,000	9	28,800
	1108	--	--	2	5800	3	9000
	1218	29	3675	43	5215	53	6315
	1219	1	350	1	350	1	350
	1260	1	1000	1	1000	1	1000
	1500	7	700	37	3700	64	6400
	FC	6	10,800	4	7200	3	5400
	LARC	2	11,880	2	11,880	2	11,880
	USQI	1	600	1	600	1	600
	SS80	10	3520	6	2112	6	2112
	SS90	4	1408	4	1408	3	1056
	UN II	3	3300	2	2200	2	2200
	UN III	9	12,600	11	15,400	7	9800
	Subtotal	400	163,475	595	208,303	684	216,129
	% of Total	14.6%	11.5%	19.9%	13.2%	23.6%	14.5%
	TOTAL	2736	$1,426,758,000	2990	$1,575,817,000	2904	$1,494,940,000

RAILROAD INDUSTRY USES $93.5 MILLION IN COMPUTERS; IBM HAS OVER 85% OF THE MARKET

Railroads in the U. S. and Canada are currently using 181 computer systems worth $93.5 million. These computers are located at 89 installation sites in 52 separate railroad firms. These market data have been calculated from a "Summary of Computers Installed in the Railroad Industry" recently issued by the Data Systems Division of the Association of American Railroads, Transportation Building, Washington, D. C. 20006.

As the table below indicates, IBM enjoys the vast majority of this market by value. Calculation of the value of the installed computer systems is based upon figures developed by the editorial research department of the EDP I&MR.

COMPUTERS INSTALLED IN THE RAILROAD INDUSTRY AS OF JUNE 30, 1966

Manufacturer	Model	# Installed	Estimated Value of Instl. ($1000's)	% Value of Installed Computers
IBM	360/30	9	3307	
	360/40	6	4410	
	360/50	1	1274	
	1401	70	22,638	
	1410	10	6958	
	1440	10	2352	
	1460	21	9261	
	1974	9	1058	
	7010	5	5537	
	7044	3	4704	
	7070	3	3969	
	7074	6	7938	
	7080	3	8085	
	7740	2	411	
		158	81,903	87.6%
UNIVAC	I	2	2200	
	III	4	3520	
	90	1	352	
	418	1	484	
	1004	5	418	
	STEP 2	1	352	
		14	7326	7.8%
Honeywell	H-200	1	250	
	1000	1	1800	
		2	2050	2.2%
General Electric	4000	1	200	
	425	2	864	
	Datanet 30	2	400	
		5	1464	1.6%
Collins Radio	8400	1	500	.5%
Burroughs	B-283	1	273	.3%
	TOTAL		$93,517,000	100%

PURCHASE-LEASEBACK FIRMS GET FIRST BID INVITATION ON GOVERNMENT ADP EQUIPMENT

Forty-three leasing firms will be asked by the General Services Administration next week to bid on the purchase-leaseback of a unit record equipment package worth approximately $2 million. The equipment, now in use at the Department of Agriculture, will represent the first offering in a pilot purchase-leaseback program being coordinated and promoted by GSA. The GSA expects to realize a saving of approximately 20% on the monthly payments for the leased DP equipment, making the annual saving to the government about $100,000.

This is the first bid for the purchase-leaseback of data processing equipment extended by GSA since the Comptroller General's office gave a nod of approval to such arrangements last March. The contract, expected to be let in October, will be a model for the government's further dealings with leasing companies on purchase-leaseback deals.

A significant feature of the government's bid request is that the GSA requests a fixed lease term of only twelve months with the right to renegotiate the contract with the same or another leasing company at the end of any twelve-month period. Typically, purchase-leaseback firms leasing DP equipment to commercial users either have a full payout lease contract of up to seven years, or use three or five year contracts. It will be interesting to see how independent leasing firms adapt to the twelve month contract clause.

NEWS BYTES

NCR has logged in its 1000th domestic order for its Series 500 computer. The order, from Dayton Malleable Iron, is for replacement of an NCR 390 currently in use. According to Richard Hill, Dayton Malleable's assistant treasurer, "The 500 is expected to do the payroll job for our 1,000 employees in one-half the time formerly required." Overseas orders for the NCR 500 are now estimated at 350 units, making the NCR 500 the most widely ordered non-IBM computer during the past twelve months. Besides routine accounting applications, the NCR 500 has been sold for applications in manufacturing production control, tabulation of manpower requirements, construction estimating and maintenance of equipment records, financial mortgage accounting and escrow analysis, utility billing, retail merchandise control, and revenue analysis.

SCAM INSTRUMENT CORP. has acquired Medalco, Inc., Woodale, Ill., a two-year-old firm that produces a data processing system for accounting, nursing care, and bookkeeping functions in hospitals. Medalco's sales in '65 are estimated at $250,000. The terms of the acquisition were not disclosed. According to Howard C. Warren, president of Scam Instrument, "The acquisition of Medalco offers opportunity to expand Scam's capabilities into new markets and also will enhance our expertise in the field of data handling for industrial processes. Scam manufactures operation recorders and data handling equipment for use in industrial process monitoring and control.

SPERRY RAND UNIVAC's Defense Systems Division has won a $10 million contract for delivery of production quantities of its model 1824 aerospace computer. The microelectronic computer, weighing 80 pounds, will be part of the Guidance and Control System of the Air Force's Titan III rocket. The contract was negotiated with the AC Electronics Division of General Motors in Milwaukee, prime contractor

with the Air Force Systems Space Division in Los Angeles. Delivery of the first computer is planned for May '67. The contract is the first publicly announced award for the use of the 1824 in a space program.

COMPUTER USAGE COMPANY reports revenues of $6.1 million in the nine months ended June 30th, 41% greater than the $4.3 million registered in the corresponding period last year (also just ahead of total fiscal '65 sales of $6 million). The software services firm's earnings increased 16% to $255,551 (37¢ a share) from $218,116 (34¢ a share) for the period.

RAYTHEON latches on to a major order for data display units. The order is for an initial batch of 561 DIDS400 (Digital Information Display System) CRT units, to be used by Air France in a computer seat reservation system. Its value is stated as close to $3 million. Eventually, between 600 and 1,000 further DIDS units will be needed in the full reservation system. Computers for the system will be two Univac 1108 machines, as part of the $7 million contract with Sperry Rand. Delivery of the first display unit is expected in October, 1967, and quantity deliveries are to start in early 1968. Selection of the Raytheon display units, according to a spokesman for Air France, was due mainly to the high quality of the continuous line character generator of the DIDS unit and the fast rewrite facilities it offers.

An interesting step towards AUTOMATED COMPUTER PRODUCTION is being described by Dr. Harlow Freitag of IBM's Watson Research Center at the WESCON Show in Los Angeles. Dr. Freitag describes two techniques for automatic design and fabrication of large arrays of integrated circuits. The first is a computer language developed by IBM that creates programs to direct automatic exposure equipment in the generation of original circuit mask artwork in the fabrication of large arrays of integrated circuits. The second is a computer controlled interlinking process that permits the connection of hundreds of "good" circuits on the wafer that has less than 100% circuit yield. According to Dr. Freitag, every wafer full of integrated circuits (which can contain enough for the logic processor of a computer) will have a customized interconnection pattern determined by its own pattern of good and bad circuits.

SIGNIFICANT NEW COMPUTER ORDERS

Company	Address	Computer(s) on Order	Expected Date of Installation
Allied Supermarkets	Detroit, Michigan	2 CDC 3300's	October 1966
			July 1967
Edelon Enterprises, Inc.	Denver, Colorado	Honeywell 1200	September 1966
Marshall Space Flight Ctr.	Huntsville, Ala.	5 UNIVAC 1108's	1967
Paul Revere Life Ins. Co.	Worcester, Mass.	IBM 360/50	1968
Smithsonian Observatory	Cambridge, Mass.	CDC 6400	October 1966
State University of N.Y.	Buffalo, N Y	IBM 360/67	July 1967
Tri-State Service Bureau	Uniontown, Pa.	NCR-315-RMC	October 1966
U S Dept of Interior	Washington, D C	IBM 360/65	
		4 IBM 360/20's	November 1966
U S Naval Ordnance	China Lake, Cal.	UNIVAC 1108	December 1966
Westinghouse	Pittsburgh, Pa.	CDC 6600	
		Several CDC 3100's	December 1966

STOCK MARKET REPORT ON SELECTED EDP FIRMS

July 22, 1966 - August 12, 1966

NEW YORK STOCK EXCHANGE	1966 High	1966 Low	3-weeks Sales in 100's	3-weeks High	3-weeks Low	Last	3-weeks Net Change	3-weeks % Change
Addressograph-Multigraph	77 3/8	54 1/8	1332	64 1/2	60 1/8	64 3/8	---	---
American R&D	44 3/4	20 1/4	1465	44 3/4	35 5/8	44 1/8	+3 1/2	+8.62
Ampex Corp.	27 5/8	17	6611	27 5/8	23	27 1/8	+1 3/4	+6.90
Burroughs	88 1/2	49 1/4	7251	88 1/2	77 1/4	86 1/2	+1 7/8	+2.22
Control Data	39 1/4	26 3/8	4350	35 1/4	29 3/4	33 1/2	---	---
Electronic Assoc.	27 1/8	16 1/8	568	19	17	18 5/8	+5/8	+3.47
General Dynamics	66 1/2	44 1/2	3652	49 7/8	44 1/2	46 3/8	-3 1/4	-6.52
General Electric	120	91 1/4	3117	102 1/4	91 1/4	94 3/4	-6 5/8	-6.54
Honeywell	96	68 1/2	957	76 3/4	70 1/4	72 7/8	-2 3/4	-3.64
IBM	375	329 5/8	1240	355	329 5/8	349 1/2	-3 7/8	-1.09
Inter. Tel & Tel	79 3/8	65 3/4	1482	75 1/8	69 1/2	71 3/4	-3 3/8	-4.49
Litton	86 1/2	66 1/2	2126	75 7/8	70	74 1/2	-7/8	-1.16
Nat. Cash Register	91 1/2	76	978	83 7/8	80 3/4	83 1/2	-1/4	-0.30
RCA	62 1/4	46	5794	50	46	49 1/2	+7/8	+1.80
Raytheon	55 1/8	36	5605	49 1/4	39 5/8	47 5/8	+5	+11.73
Scientific Data	79 1/2	63 7/8	1391	79 1/2	63 7/8	78 3/8	---	---
SCM	91 7/8	47 1/4	9265	73 1/4	62 3/4	70 3/4	-1 5/8	-2.24
Singer	64 3/4	46 1/2	1183	54 1/4	46 1/2	49 3/4	-1/8	-0.25
Sperry Rand	33 1/4	17 1/8	21,899	33 1/4	27 1/2	32 7/8	+2 5/8	+8.68
Teledyne	133	87	5342	113 1/4	91 3/8	103 3/4	-9 5/8	-8.48
NYSE COMPUTER STOCK AVERAGE							-0.85	+0.46
AMERICAN STOCK EXCHANGE								
ANelex	28	12 1/4	310	15 3/8	12 1/4	12 1/4	-3	-19.67
Bunker-Ramo	10 1/2	7 1/4	909	9 3/8	8	8 1/4	-1 1/8	-12.00
Cal Comp	25 7/8	13 1/4	172	24 1/2	20 5/8	21 5/8	-1 7/8	-7.98
Clary	8	4 5/8	279	5 5/8	4 5/8	5 1/4	---	---
Computer Application	26 1/4	16 3/8	128	17 7/8	16 3/8	17 1/8	-5/8	-3.52
Computer Science	37 1/4	19 1/8	651	33 3/8	29 1/4	31 1/2	-1 5/8	-4.89
Milgo Elect.	8 7/8	5 5/8	65	7	5 5/8	5 5/8	-1 3/8	-19.64
Planning Res.	36 1/2	18	127	23 1/4	18	19 1/8	-4 3/8	-18.62
Potter Instrument	26 3/8	14 1/8	251	16 1/2	14 1/8	14 1/8	-2 3/8	-14.39
AMEX COMPUTER STOCK AVERAGE							-1.82	-11.19

OVER-THE-COUNTER	1966 High Bid	1966 Low Bid	August 12 Bid	August 12 Asked	3 weeks ago Bid
C-E-I-R	15 1/4	8 7/8	8 7/8	9 1/4	10 3/8
Computer Usage	24 1/2	17 3/4	19	21	20 3/4
Data Products	4	2 3/8	3 1/4	3 3/4	3 1/2
Digitronics	12 3/4	7 7/8	8 1/8	8 5/8	8 3/8
Fabri-Tex	26	8 7/8	12 7/8	13 3/8	13 7/8
Management Assistance	45 3/4	30 1/4	35	35 1/2	33 1/8
Memorex	64 1/2	31 1/2	64 1/2	65 1/2	57 1/4
Mohawk Data Sciences	46	19	35	37 5/8	46
Randolph Computer Corp.	21 3/4	19 3/4	19 3/4	21 1/2	*

* New listing on this table.

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September 15, 1966 Vol. 2, No. 9

SPECIAL FEATURE THIS ISSUE
Monthly Computer Census. . . . . .Page 6

E|D|P
INDUSTRY AND MARKET REPORT

A SEMI-MONTHLY NEWSLETTER FOR EXECUTIVES IN THE ELECTRONIC DATA PROCESSING INDUSTRY, AND THE FINANCIAL COMMUNITY.

P. J. McGovern, Editor
Telephone 617/332-8840

NEW COMPUTER USE STUDY INDICATES COMPUTER COSTS IN MANUFACTURING FIRMS AVERAGE .54% OF ANNUAL SALES

Manufacturing firms in the U.S. are now finding their total computer costs average .54% of annual sales. Of this, a typical firm spends 37% on equipment, primarily for machine rental; 19% on systems and planning activity, including new applications design and programming; and the remaining 44% on other operating costs such as salaries, supplies, maintenance programming and cost of space.

These are some of the findings of a year-long study of computer use at 33 representative manufacturing firms in the U.S. conducted by Booz, Allen & Hamilton, Inc., the international consulting firm.

The companies in the study represent three basic areas of manufacturing: (1) 25% make continuous process-produced consumer products such as food processing and clothing manufacturer; (2) 45% make fabricated and assembled products such as heavy industrial equipment; and (3) 30% make continuous process-produced industrial products such as chemicals or steel which are used in the manufacture of finished items. Annual sales of the 33 firms range from under $100 million to several with more than $1 billion. A total of 189 interviews were conducted with top, operating and computer management in the firms participating in the study.

The survey found that each of the 33 firms uses computers. The median firm has six computers at two locations (see Chart 1). The firms in the study have a wide range of computer experience, extending from 1 to 12 years, with a median of nine years.

The total computer costs--machines, systems and planning and all other operating costs--vary from $1.27 to $13.30 per thousand dollars of sales. Actual dollar expenditures range from $128,000 per year to $50,000,000 per year. The median company spends $1,186,000 annually, or $5.40 per thousand dollars of sales (see Chart 2).

An analysis of the total computer costs by the size of the firms shows there is a tendency for companies under $100 million in sales to spend more of their sales dollar on computers than larger companies, primarily because of the relatively high base cost involved in using a computer (see Chart 3).

Actual dollar computer equipment costs range from $60,000 to $20,000,000 per year, systems cost from $20,000 to $14,000,000 per year, and other operating costs from $47,000 to $16,000,000.

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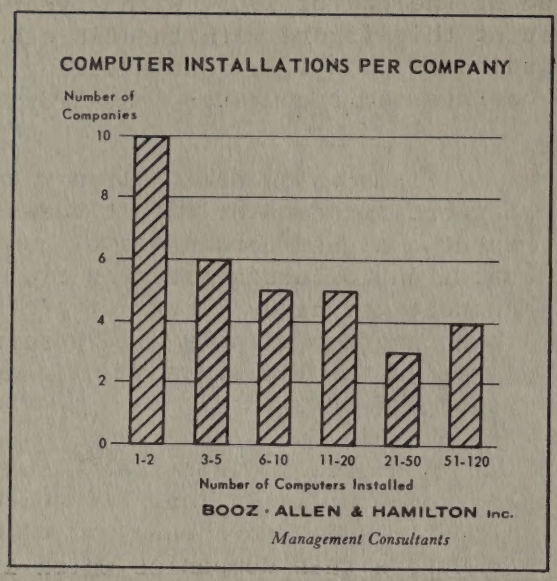


Chart 1

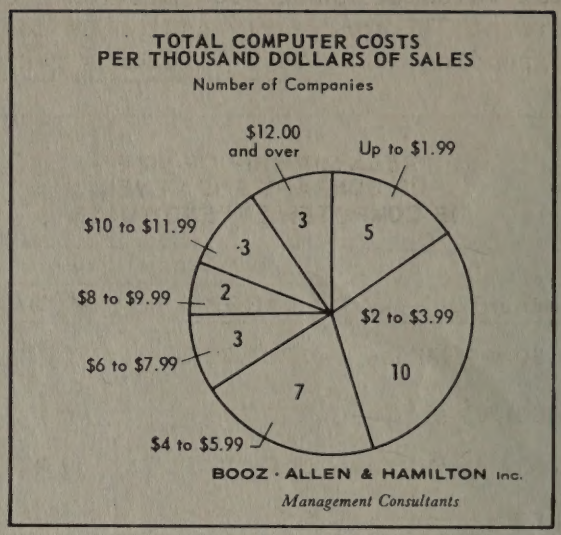


Chart 2

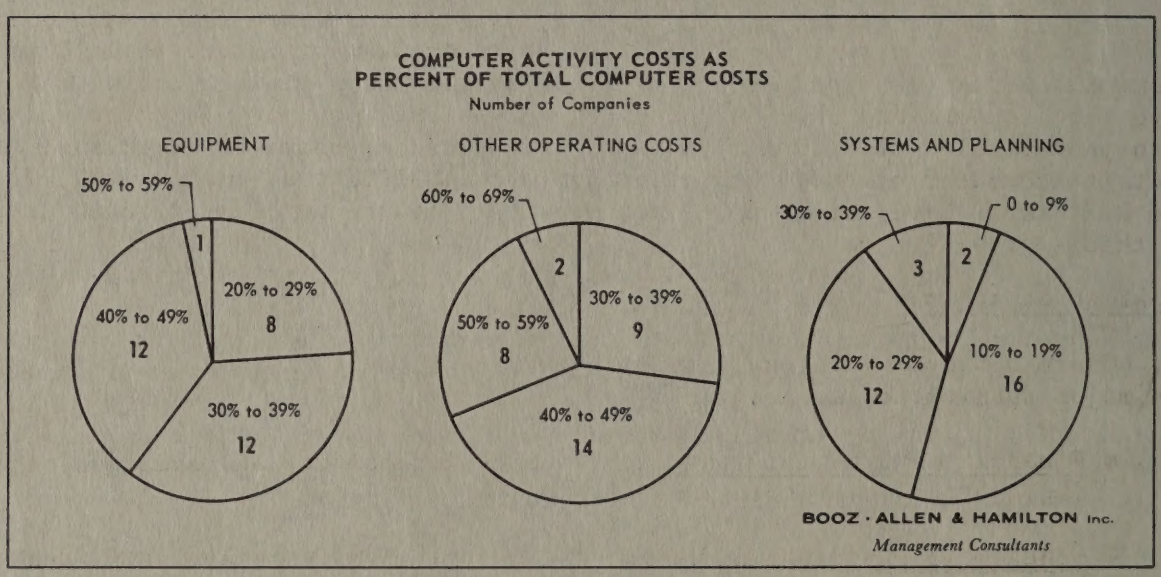
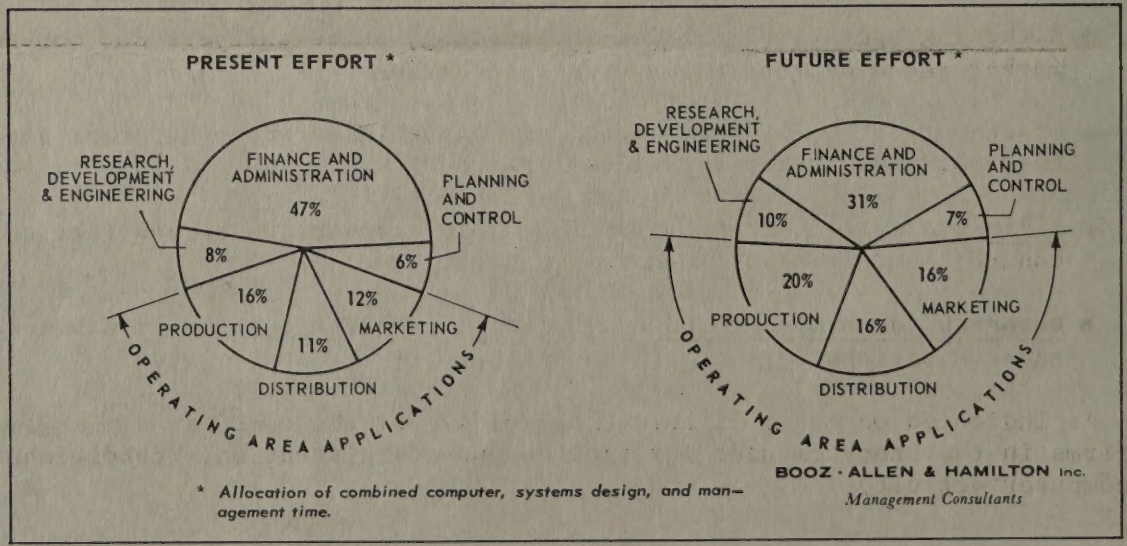


Chart 4



* *Allocation of combined computer, systems design, and management time.*

Chart 5

As indicated in our July 28th issue, U.S. manufacturing firms had approximately $2.64 billion in computers installed at the end of 1965, with a yearly rental value of about $660 million. Combining this figure with the BAH study figure of 37% for yearly equipment costs indicates that U.S. manufacturing firms are spending about $1.8 billion a year to operate their computer installations.

RELATIONSHIP OF SIZE OF COMPANY AND LEVEL OF COMPUTER EXPENDITURES

Annual Sales	Per Cent of Sales RANGE	MEDIAN
$ 50-99 Million	0.28-1.33%	0.71%
$ 100-199 Million	0.13-1.26%	0.49%
$200-999 Million	0.14-1.01%	0.46%
$1 Billion and up	0.22-1.20%	0.58%

BOOZ · ALLEN & HAMILTON Inc.
Management Consultants

Chart 3

Firms which Booz, Allen rates highest in computer effectiveness spend a higher percentage of annual sales on computers, ranging from 1.0 percent for highest rate effectiveness to an average of only 0.13 percent for firms in the lowest range of computer usage effectiveness.

Also, firms which have been using the computer for a long time were found to spend more money on their computers than companies which are relatively new to the field. For example, companies which have been computer users for more than 10 years spend an average of 0.68 percent of sales on computers while those with less than five years experience spend 0.31 percent of sales. Or, put another way: A firm with annual sales of $100 million with five years of computer experience can expect its computer costs to increase from about $310,000 a year to $680,000 over the next five years, if it follows the pattern of the more experienced companies in this survey.

Application areas

Chart 5 provides an analysis of the percentage of computer time in each of six major application areas:

- Financial and administrative. Financial reporting and analysis, accounting, payroll, invoicing and billing.
- Management planning and control. Capital investment analysis, and resource allocation, mathematical model simulation.
- Marketing operations. Sales forecasting, sales analysis and control, market research, and sales order processing.
- Distribution operations. Warehouse operations, shipment order processing, traffic, and in-the-field inventory control.
- Factory operations. Materials controls, production scheduling, quality control, and in-plant inventory control.
- Research, development and engineering. Product testing, product design and evaluation.

As indicated on Chart 5, an average of 47% of the computer time among the 33 firms in the study is used for finance and administration, "traditional" areas of computer activity.

The rest of the computer effort - 53% - is spent in the operating areas - production, distribution, marketing - and in planning and control, and research and development and engineering.

By 1970, these companies will devote only an average of 31% of their computer effort to finance and administration and the remainder to the operating and other areas.

A major trend in these companies is a balancing of total computer effort across all basic application areas. Most are well established in applications directly related to the operating areas characteristic of the orientation of their particular type of business. For example, the continuous-process industrial product firms tend to put a greater emphasis on research and development and engineering applications. By 1970, these firms plan to significantly increase computer effort in production, distribution and marketing applications.

Fabricated and assembled product firms are now putting most of their efforts into production applications. By 1970, these firms plan greatest relative increases in applications to be in research and development and engineering, and distribution.

Consumer product firms now emphasize marketing and distribution in their computer operations. By 1970, these firms plan to increase their computer use in production, and research and development and engineering applications.

Significantly, all three groups place the same relatively limited emphasis on top management planning and control applications. Presumably this is because of a slower evolution of the development of mathematical and other decision assisting techniques which enable the computer to be most effective in this area. However, interest and expectations in operations research/computer applications for management planning and control decision assistance are high.

Virtually all of the firms said they intended to gradually undertake more sub-systems integration. All are in the process of coordinating logically related specific computer systems into larger units. For example, 11 of the firms have made considerable progress in integrating systems in the distribution function.

In the next four years, another 13 of the companies plan to have their distribution systems fairly well integrated. Only five firms have made much progress in integrating factory systems, but by 1970, 21 additional firms expect to have integrated computer systems in their factory operations.

INTERNATIONAL REPORT

DE GAULLE GOVERNMENT MOVES TO PROMOTE FRENCH COMPUTER INDUSTRY

Gen. Charles De Gaulle is stepping up his government's efforts to eliminate France's dependence on American computer technology, particularly in the large-scale scientific area. At a recent meeting of the French Government, presided over by General De Gaulle, a grand "Plan Calcul" was initiated which is designed to: (1) promote a merger between the two largest French-owned computer firms, Compagnie Europeenne d'Automatisme Electronicque (C.E.A.) and Societe Europeenne d'Automatisme (S.E.A.); (2) lead to the development of a new line of advanced scientific computers; (3) award a government grant of more than $100 million to finance this development; and (4) appoint a Delegate-Generale with powers to supervise this development.

The background reason behind this decision is that following the take-over by General Electric of Machines Bull, French-owned industry accounts for only 10-15% of the computers used in France. The immediate reason appears to be the refusal of the Export Control Board of the U.S. Department of Commerce to grant export licenses for the shipment of three Control Data 6600 super-scale computers to France. Two of these computers were to be used in developing France's atomic energy program. . .a program the U.S. feels runs counter to the policy of non-proliferation of nuclear weapons. The other 6600, although intended for commercial applications, was also refused an export license because there was no assurance that the computer would not also be applied to problems in the nuclear area. In line with this, De Gaulle has appointed M. R. Galley, head of the French Atomic Energy Commission, delegate-Generale of this project.

Successful implementation of the "Plan Calcul" can also be expected to contribute to increased English-French cooperation on the development of large computers. An early plan for such cooperation died on the vine because the French computer industry consisted of a number of small, scattered firms without interest or authority in negotiating an inter-country computer project.

If the French plan is successful, and if its success is imitated by other foreign lands such as Germany, England, Italy and Japan, it could limit the market available to American-made large computer systems. Particularly hard hit by this development would be Control Data which has already been denied export shipment of $15 million worth of 6600's to France. . .a potential income equal to nearly 10% of its annual sales in the last fiscal year.

BRITISH SCENE: I.C.T. has managed to get back into the black for the first half of fiscal '66. The success of its 1900 computer line is given credit. Over 600 orders for the 1900 have been logged in.... Salary freeze is causing computer programmers and systems people, much in demand to support new computer installations, to switch jobs with calculated frequency. Only way to get a raise is to accept a better offer from another firm. Recruiting firms and publications running computer personnel ads are having a heyday.... Flowers Report recommendation for a computer for the Medical Research Council has resulted in an order for a GEC 90-300, an SDS 930 made by GEC under license. Value is approximately $800,000. It is also expected that MRC will be putting in the first UK order for a Sigma 2.... Honeywell sets up a programming group in the UK to support their 200 series. Initial staff is 20, but expected to increase to 40 by year end.... British treasury has consented to the plan whereby Britain's De La Rue Co. sells half of its 50% holding in De La Rue Bull to the U.S.'s General Electric, giving GE a direct 25% interest. The other 50% of De La Rue Bull is held by Bull-General Electric, which in turn is 51% owned by GE. Under this plan GE has majority ownership of the De La Rue Bull, the British marketing organization for Bull-GE computers.

"It's the same the whole world over".....Twenty USSR-made MINSK 2/22 digital computers are being shipped to Czechoslovakia this year. However, the software promised with the systems has not been completed on schedule and is not available. So the Czech importer managed to wrestle a 28% price discount from the Soviets on price of the equipment. Many a U.S. user wishes he could do as well in a similar situation.

Czechoslovakia is experimenting with digital computers in direct process control. Four out of five computers used in the experiments are imported from the West: NCR 315 (chemical factory), ICT 1905 (heavy machinery), LEO 360 and

(Continued on last page)

MONTHLY COMPUTER CENSUS

The number of electronic digital computers installed or in production at any one time has been increasing at a bewildering pace in the past several years. New vendors have come into the market, and familiar machines have gone out of production. Some machines have been received with open arms by users -- others have been given the cold shoulder.

To aid readers of the EDP I&MR in keeping with this mushrooming activity, we compile and publish this monthly report on the number of general purpose electronic computers made by American-based companies which are installed or on order as of the preceding month. These figures included installations and orders outside the United States. We update this computer census monthly, so that it will serve as a "box score" of progress in following the growth of the American computer industry, and of the computing power it builds.

In general, manufacturers in the computer field do not officially release installation and on order figures. The figures in this table are developed through a continuing market survey conducted by our research staff. This market research program develops a documented data file on over 80% of the computer installations in the United States. A similar program is conducted for overseas installations.

Comments on this census from informed readers will be welcomed.

AS OF JULY 10, 1966

NAME OF MANUFACTURER	NAME OF COMPUTER	SOLID STATE?	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS	NUMBER OF UNFILLED ORDERS
Advanced Scientific Instruments	ASI 210	Y	$3850	4/62	25	0
	ASI 2100	Y	$4200	12/63	7	0
	ADVANCE 6020	Y	$4400	4/65	10	5
	ADVANCE 6040	Y	$5600	7/65	5	4
	ADVANCE 6050	Y	$9000	2/66	2	6
	ADVANCE 6070	Y	$15,000	10/65	3	5
	ADVANCE 6130	Y	$1000	11/66	0	3
Autonetics	RECOMP II	Y	$2495	11/58	41	X
	RECOMP III	Y	$1495	6/61	9	X
Bunker-Ramo Corp.	BR-130	Y	$2000	10/61	161	3
	BR-133	Y	$2400	5/64	21	3
	BR-230	Y	$2680	8/63	15	X
	BR-300	Y	$3000	3/59	36	X
	BR-330	Y	$4000	12/60	34	X
	BR-340	Y	$7000	12/63	20	X
Burroughs	205	N	$4600	1/54	48	X
	220	N	$14,000	10/58	38	X
	E101-103	N	$875	1/56	140	X
	B100	Y	$2800	8/64	148	20
	B250	Y	$4200	11/61	89	2
	B260	Y	$3750	11/62	224	6
	B270	Y	$7000	7/62	154	12
	B280	Y	$6500	7/62	128	15
	B300	Y	$10,000	7/65	89	90
	B2500	Y	$5000	1/67	0	26
	B3500	Y	$14,000	5/67	0	20
	B5500	Y	$22,000	3/63	53	10
	B6500	Y	$33,000	2/68	0	2
	B8500	Y	$200,000	2/67	0	1
Computer Control Co.	DDP-24	Y	$2500	5/63	76	8
	DDP-116	Y	$900	4/65	90	30
	DDP-124	Y	$2050	3/66	12	18
	DDP-224	Y	$3300	3/65	30	20
Control Data Corporation	G-15	N	$1600	7/55	310	X
	G-20	Y	$15,500	4/61	23	X
	LGP-21	Y	$725	12/62	119	X
	LGP-30	semi	$1300	9/56	125	X
	RPC-4000	Y	$1875	1/61	55	X
	160*/160A/160G	Y	$2100/$4000/$12,000	5/60;7/61;3/64	451	5
	924/924A	Y	$11,000	8/61	28	X
	1604/1604A	Y	$45,000	1/60	59	X
	1700	Y	$4000	5/66	8	80
	3100	Y	$11,000	12/64	78	35
	3200	Y	$14,000	5/64	90	X
	3300	Y	$15,000	9/65	16	40
	3400	Y	$25,000	11/64	19	X
	3500	Y	$30,000	9/66	0	10
	3600	Y	$58,000	6/63	50	2
	3800	Y	$60,000	2/66	3	12
	6400	Y	$50,000	5/66	4	14
	6600	Y	$85,000	8/64	15	9
	6800	Y	$130,000	4/67	0	4
Data Machines, Inc.	620	Y	$900	11/65	8	32
Digital Equipment Corp.	PDP-1	Y	$3400	11/60	60	X
	PDP-4	Y	$1700	8/62	56	2
	PDP-5	Y	$900	9/63	113	1
	PDP-6	Y	$10,000	10/64	19	4
	PDP-7	Y	$1300	11/64	69	50
	PDP-8	Y	$525	4/65	325	275
El-tronics, Inc.	ALWAC IIIE	N	$1820	2/54	19	X
Electronic Associates, Inc.	8400	Y	$10,000	6/65	5	6
Friden	6010	Y	$600	6/63	430	80
General Electric	115	Y	$2200	12/65	98	520
	205	Y	$2900	6/64	45	X
	210	Y	$16,000	7/59	50	X
	215	Y	$6000	9/63	55	X
	225	Y	$9000	4/61	209	X
	235	Y	$12,000	4/64	63	5
	415	Y	$7600	5/64	165	72
	425	Y	$9600	6/64	64	46
	435	Y	$14,000	10/64	25	18
	625/635	Y	$55,000	12/64	26	28
	645	Y	$150,000	12/64	0	10
Honeywell Electronic Data Processing	H-120	Y	$3500	1/66	120	280
	H-200	Y	$5700	3/64	790	120
	H-400	Y	$8500	12/61	120	X

NAME OF MANUFACTURER	NAME OF COMPUTER	SOLID STATE?	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS	NUMBER OF UNFILLED ORDERS
Honeywell (cont'd)	H-800	Y	$26,000	12/60	87	3
	H-1200	Y	$7300	2/66	10	58
	H-1400	Y	$14,000	1/64	12	1
	H-1800	Y	$35,000	1/64	18	3
	H-2200	Y	$13,000	1/66	12	48
	H-4200	Y	$20,500	3/67	0	7
	H-8200	Y	$35,000	3/68	0	3
	DATAmatic 1000	N	$40,000	12/57	3	X
IBM	305	N	$3600	12/57	155	X
	360/20	Y	$2000	12/65	260	6450
	360/30	Y	$7500	5/65	1400	4300
	360/40	Y	$15,000	4/65	765	1600
	360/44	Y	$10,000	7/66	0	120
	360/50	Y	$26,000	8/65	70	600
	360/62	Y	$55,000	11/65	1	X
	360/65	Y	$50,000	11/65	11	160
	360/67	Y	$75,000	9/66	0	55
	360/75	Y	$78,000	2/66	5	30
	360/90 Series	Y	$140,000	6/67	0	9
	650	N	$4800	11/54	200	X
	1130	Y	$1200	11/65	300	3650
	1401	Y	$6600	9/60	6650	275
	1401-G	Y	$2300	5/64	1560	150
	1410	Y	$14,200	11/61	778	110
	1440	Y	$4800	4/63	3075	350
	1460	Y	$11,500	10/63	1900	120
	1620 I, II	Y	$4000	9/60	1700	40
	1800	Y	$7600	1/66	20	275
	701	N	$5000	4/53	1	X
	7010	Y	$22,600	10/63	200	10
	702	N	$6900	2/55	7	X
	7030	Y	$160,000	5/61	6	X
	704	N	$32,000	12/55	35	X
	7040	Y	$22,000	6/63	118	5
	7044	Y	$32,000	6/63	125	9
	705	N	$38,000	11/55	56	X
	7070, 2, 4	Y	$27,000	3/60	332	X
	7080	Y	$55,000	8/61	83	X
	709	N	$40,000	8/58	10	X
	7090	Y	$63,500	11/59	45	1
	7094	Y	$72,500	9/62	122	3
	7094 II	Y	$78,500	4/64	122	9
Monroe Calculating Machine Co.	Monrobot XI	Y	$700	12/60	490	100
National Cash Register Co.	NCR - 304	Y	$14,000	1/60	26	X
	NCR - 310	Y	$2500	5/61	20	X
	NCR - 315	Y	$8500	5/62	390	30
	NCR - 315-RMC	Y	$12,000	9/65	35	70
	NCR - 390	Y	$1850	5/61	1000	65
	NCR - 500	Y	$1500	10/65	350	700
Philco	1000	Y	$7010	6/63	20	X
	2000-210, 211	Y	$40,000	10/58	18	X
	2000-212	Y	$52,000	1/63	11	X
Radio Corporation of America	RCA 301	Y	$7000	2/61	647	4
	RCA 3301	Y	$17,000	7/64	52	13
	RCA 501	Y	$14,000	6/59	99	X
	RCA 601	Y	$35,000	11/62	5	X
	Spectra 70/15	Y	$3500	9/65	48	110
	Spectra 70/25	Y	$5700	9/65	26	65
	Spectra 70/35	Y	$9000	11/66	0	75
	Spectra 70/45	Y	$15,000	11/65	9	128
	Spectra 70/55	Y	$30,000	7/66	0	12
Raytheon	250	Y	$1200	12/60	175	X
	440	Y	$3500	3/64	14	3
	520	Y	$3200	10/65	12	6
Scientific Control Systems	650	Y	$500	4/66	1	6
	655	Y	$1800	9/66	0	2
	660	Y	$2000	10/65	3	3
	670	Y	$2600	5/66	1	2
Scientific Data Systems Inc.	SDS-92	Y	$1500	4/65	50	37
	SDS-910	Y	$2000	8/62	177	8
	SDS-920	Y	$2900	9/62	122	10
	SDS-925	Y	$3000	12/64	20	18
	SDS-930	Y	$3400	6/64	116	27
	SDS-940	Y	$10,000	4/66	3	14
	SDS-9300	Y	$7000	11/64	26	8
	Sigma 7	Y	$12,000	12/66	0	20
Systems Engineering Labs	SEL-810/810A	Y	$1000	9/65	21	9
	SEL-840/840A	Y	$1400	11/65	3	5
UNIVAC	I & II	N	$25,000	3/51 & 11/57	28	X
	III	Y	$20,000	8/62	81	1
	File Computers	N	$15,000	8/56	18	X
	Solid-State 80I,II, 90 I,II & Step	Y	$8000	8/58	268	X
	418	Y	$11,000	6/63	82	39
	490 Series	Y	$35,000	12/61	100	62
	1004	Y	$1900	2/63	3325	110
	1005	Y	$2400	4/66	60	200
	1050	Y	$8000	9/63	280	50
	1100 Series (except 1107)	N	$35,000	12/50	11	X
	1107	Y	$55,000	10/62	30	X
	1108	Y	$65,000	9/65	13	36
	9200	Y	$1500	6/67	0	60
	9300	Y	$3400	6/67	0	20
	LARC	Y	$135,000	5/60	2	X
				TOTALS	34,637	22,651

X = no longer in production

* To avoid double counting, note that the Control Data 160 serves as the central processor of the NCR 310. Also, many of the orders for the IBM 7044, 7074, and 7094 I and II's are not for new machines but for conversion from existing 7040, 7070, and 7090 computers respectively.

STOCK MARKET REPORT ON SELECTED EDP FIRMS

August 12, 1966 - September 9, 1966

NEW YORK STOCK EXCHANGE	1966 High	1966 Low	4-weeks Sales in 100's	4-weeks High	4-weeks Low	Last	4-weeks Net Change	4-weeks % Change
Addressograph-Multigraph	77 3/8	51 1/2	1626	64 1/2	51 1/2	55	-9	-13.98
American R&D	44 3/4	20 1/4	1440	44 1/2	29 1/4	21 3/4	-12 3/8	-28.04
Ampex Corp	27 5/8	17	7297	27 3/8	20	21 1/2	-5 5/8	-20.74
Burroughs	88 1/2	49 1/4	10,317	86 3/4	66 1/8	73 1/4	-5 1/8	-5.92
Collins Radio	85 3/8	46	10,033	69 3/8	56 3/4	60 1/2	-5	-7.63
Control Data	39 1/4	26 3/8	7014	36 1/2	30	32 1/4	-1 1/4	-3.73
Electronic Assoc.	27 1/8	15 1/8	903	19 3/8	15 1/8	15 1/2	-3 1/8	-16.78
General Electric	120	80	6050	95 1/4	80	81	-13 3/4	-14.51
Honeywell	96	64	1736	74 1/4	64	64 1/2	-8	-10.98
IBM	375	306 1/4	2594	350	306 1/4	315	-34 1/2	-0.98
Inter. Tel & Tel	79 3/8	64	2444	73 1/4	64	64 1/2	-7 1/4	-1.01
Litton	86 1/2	59 1/8	5828	77	59 1/8	61 3/4	-12 3/4	-17.11
Nat. Cash Register	91 1/2	69 1/8	1221	83	69 1/8	70	-13 1/2	-16.17
RCA	62 1/4	41	8758	49 1/4	41	43 1/4	-6 1/4	-12.63
Raytheon	55 1/8	36	15,280	53 1/4	45 1/2	49 1/4	+1 5/8	+3.41
SCM	91 7/8	47 1/4	14,286	71 3/8	53 7/8	58 1/2	-12 1/4	-17.31
Scientific Data	81 1/8	54 5/8	6077	81 1/8	54 5/8	59 1/2	-18 7/8	-24.08
Singer	64 3/4	42 1/8	1039	49 1/2	42 1/8	42 3/4	-6 3/8	-12.81
Sperry Rand	33 5/8	17 1/8	38,197	33 5/8	26	28 1/8	-4 3/4	-14.45
Teledyne	133	68 1/4	5266	104 5/8	68 1/4	73 1/2	-30	-28.93
NYSE COMPUTER STOCK AVERAGE							-10.41	-13.22
AMERICAN STOCK EXCHANGE								
ANelex	28	8	564	13 1/2	8	8 1/2	-3 3/4	-30.61
Audio Devices, Inc.	41 1/4	21 7/8	728	35 3/4	28 3/4	31 3/8	-4 3/8	-12.24
Bunker-Ramo	10 1/2	6 5/8	770	8 5/8	6 5/8	7 1/4	-1 1/4	-15.15
Cal Comp	28 1/4	13 1/4	669	28 1/4	21 1/4	25 7/8	+4 1/4	+19.65
Clary	8	4 1/4	325	5 5/8	4 1/4	4 5/8	-5/8	-11.90
Computer Applications	26 1/4	12 1/2	194	17 5/8	12 1/2	13 1/4	-3 7/8	-22.63
Computer Science	37 1/4	19 1/8	1161	32 1/4	22 1/8	25 3/8	-6 1/8	-19.44
Levin-Townsend Comp Corp	26 7/8	14 3/4	1221	26 3/8	14 3/4	16 3/4	-9 5/8	-36.49
Milgo Electronics	8 7/8	4 5/8	109	5 3/4	4 5/8	4 3/4	-7/8	-15.56
Planning Research	36 1/2	14 1/4	180	20	14 1/4	17 3/8	-1 3/4	-9.15
Potter Instrument	26 3/8	12 5/8	295	14 7/8	12 5/8	12 3/4	-1 3/8	-9.73
AMEX COMPUTER STOCK AVERAGE							-2.67	-14.84

	OVER-THE-COUNTER	1966 High Bid	1966 Low Bid	September 9 Bid	September 9 Asked	4 weeks ago Bid
*	Applied Data Research, Inc.	6 3/4	3 1/2	3 1/2	4 1/4	4 5/8
*	Aries Corp.	8 1/2	3	7 1/4	7 3/4	8
*	Automatic Data Processing	50	29 1/2	32	35 1/2	46
*	Bolt, Beranek & Newman, Inc.	16	7 1/2	8 1/2	9 1/4	10 5/8
	C-E-I-R	15 1/4	6 1/8	6 1/8	7 1/4	8 7/8
	Computer Usage	24 1/2	16 3/4	17 1/4	19 1/8	19
	Data Products	4	2 3/8	3	3 1/2	3 1/4
+	Digital Equipment	26	22	23 3/4	24 1/4	
	Digitronics	12 3/4	5 7/8	5 7/8	6 3/8	8 1/8
*	Documentation, Inc.	8 1/2	5 3/8	5 3/8	5 3/4	5 7/8
*	DPA, Inc.	19 7/8	6 3/4	7	7 1/2	9
*	Electronic Memories	26	16 1/4	17	17 3/4	22 1/2
	Fabri-Tek	26	8 7/8	9 1/4	9 3/4	12 7/8
*	Informatics, Inc.	8 1/4	7 3/4	7 3/4	8 5/8	8 1/4
*	Leasco Data Proc Equip Corp	38 1/4	19 1/2	33	35 1/4	35
	Management Assistance	45 3/4	24 1/2	27	27 1/2	35
	Memorex	64 1/2	31 1/2	53 1/4	54 1/4	64 1/2
	Mohawk Data Sciences	46	19	22 1/2	25 1/8	35
	Randolph Computer Corp	21 3/4	12	13 1/2	15 1/8	19 3/4
*	Recognition Equipment	72	39	46	50	70 1/2
*	Systems Engineering Labs			4 7/8	5 3/8	5 1/2
*	University Computing Co.	28 1/2	9 5/8	21 1/4	22	26

* New listing on this table.
\+ New issue.

KDF 7 (steel mills). Czech experts feel that a minimum of 25 digital computers are needed for direct process control applications in their country by 1970. Also, they feel there is a market for 40 to 50 desk-type digital computers in universities and research laboratories by 1970. The recent relaxation of export control regulations on shipping U.S. computers to East Europe, and the decision by the Import-Export Bank to guarantee commercial credits to Czechoslovakia, opens this market to American firms.

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E|D|P
INDUSTRY AND MARKET REPORT

A SEMI-MONTHLY NEWSLETTER FOR EXECUTIVES IN THE ELECTRONIC DATA PROCESSING INDUSTRY, AND THE FINANCIAL COMMUNITY.

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IBM REDUCES PURCHASE PRICE, RAISES RENTAL RATES ON COMPUTERS; COMPETITORS QUICK TO FOLLOW WITH PRICING CHANGES

The "price umbrella" that IBM holds over the EDP industry was bared to its ribs during the last few weeks. A pricing change by IBM affects the structure of this "price umbrella", so when IBM made its price change (as predicted in the July 28th issue of EDP I&MR), most manufacturers promptly reacted to preserve their relative positions in the price/performance hierarchy of the marketplace.

IBM's price change, announced late last month, is designed to accelerate cash receipts from customers installing the 360 system. The company announced a 3% decrease in the purchase price of most elements of the 360, retroactive to September 19th. It also increased the rental price of the same units by 3%, effective January 1st. This change lowers IBM's purchase-to-rent ratio on the 360 by some 6%, from 50-to-1 to 47-to-1.

The reason for this change was explained in our July 28th issue. There we predicted that IBM would "reduce the purchase-to-rent ratio on 360 equipment", noting that "currently about 93-94% of 360 customers are renting their equipment. 360 equipment shipped during 1966 will generate approximately $270 million additional income during this year. However, IBM's direct material and shipping costs (estimated at 20% of the $2.5 billion worth of 360's to be shipped in '66) will be approximately $500 million. To balance these figures, we anticipate that IBM must strive to reduce its computer rentals to 85-86% of shipments. . .by comparison, about 80% of second-generation IBM computers are now rented. To achieve this, reduction of 5-8% in the purchase-to-rent ratio of 360's will probably be required."

To set the stage for the above move, IBM announced earlier in the month that customers desiring to purchase their equipment on the IBM installment payment plan would have to make a downpayment of 25% of the system cost, rather than the 10% previously required. Also, the interest rate would be at 1 1/2% more than the New York prime interest rate, rather than 1% more, as previously.

IBM's competitors were quick to react to the 3% increase in rental prices:

General Electric announced a 4% increase in the rental charges for its 400 and 600 computer series, and its Datanet-30 communications controller. The changes are effective October 24th.

Honeywell announced increases of 2-4% on the rental charges of its 200 Series computers, effective December 15th.

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NCR announced a 5% increase in the rental charges for the processor of its Series 500 system, effective October 31st.

RCA announced increases of 3% in the rental charges for its 301, 3301, and Spectra 70/35, 45, and 55 computer systems, effective February 1st.

SDS announced increases of 3-5% on the rental charges of its Sigma 2 and Sigma 7 computers, effective December 15th.

Reactions to IBM's 3% decrease in the 360 purchase price were more mixed.

Paralleling IBM, RCA announced reductions of 3-5% in the purchase price of all Spectra 70 units. The Spectra 70/15 was decreased by 5%, while the 70/25, 35, 45, and 55 were decreased by 3%. However, RCA has raised maintenance rates on purchased processors by "an amount generally commensurate with the increase in monthly rentals", so customers will realize only part of the saving in the reduced purchase prices.

Honeywell and SDS increased the purchase prices on several of their units. Honeywell announced a 2-4% increase in the purchase price of its 200 series. SDS upped the purchase price of the Sigma 7 by 3-5%, while announcing a 30% improvement in the performance of the processor.

General Electric and NCR made no change in the purchase price of their computers.

Control Data, Burroughs, and Univac have made no indication that they have immediate plans to alter either the rental or the purchase price of their equipment.

IBM's price changes should result in beneficial financial effects for the entire industry. It gives IBM's competitors an opportunity to increase the revenue-producing power of their computers while keeping the same price/performance relationship with IBM's 360 computers. Also, since the increased rental prices do not apply to customers who commit themselves to long-term lease contracts before the rental increase takes effect, it provides users a strong incentive to accept long-term (three or five year) leases. The manufacturer can then factor these into sale-leaseback deals with financial institutions to acquire immediate capital.

User reaction to the rental price changes has been modest. Most accept it with resignation, noting that such inflationary factors as rising interest rates and a tight money market are raising the "cost of doing business" for firms that lease EDP equipment. Thus, they say, the rental increases are understandable. Only a small percentage of users, however, feel that purchase of their computer is feasible at this time. Instead, many say they plan to investigate either purchase-leaseback from a third party for 360 equipment or longer term leases (at reduced rentals) from manufacturers of non-IBM computers.

With over 21,000 computers on order, and with delivery dates extending one year to eighteen months ahead for most equipment, the customer today finds himself in more of a "seller's market" than the normally highly competitive EDP industry has ever known. Some people have predicted a "price war" for the EDP industry, and it appears that aspects of it are developing. . . but it is being directed at the customer, not against the competition.

PURCHASE-LEASEBACK FIRMS SEE CUSTOMER ACCEPTANCE INCREASING AS THEIR AVAILABLE CAPITAL DIMINISHES

The recent pricing shifts by computer manufacturers - especially the increase in rental rates and the reduction in the purchase price of IBM's 360 line - enhances the business opportunities for purchase-leaseback firms. These firms buy computing and data processing equipment from a manufacturer, either directly or through the current user, then lease it to the user for contract periods lasting 30 days to eight years. . . usually at monthly rentals 5% to 30% lower than those offered by the equipment manufacturer.

Both parties in purchase-leaseback deals stand to benefit from recent price changes. Customers see the broadened spread between the manufacturer's rental rates and those offered by the third-party leasing firm in many instances, heightening their interest in such arrangements. Also, with the reduced purchase-to-rent ratio, leasing firms can expect quicker recovery of the computer's purchase price and thereby earlier profits.

There are additional factors favorable to computer leasing firms:

(1) After numerous advertisements, articles, and speeches by leasing industry participants, users show more understanding of the financial benefits in purchase-leaseback arrangements. An informal survey conducted at the recent BEMA meeting indicated that 23% more customers plan to lease data processing equipment from a third party next year than did this year.

(2) The Federal Government has endorsed purchase-leaseback contracts for data processing equipment. The first such deal was awarded this month to LMC Data for punched card equipment worth about $600,000. These units will be leased back to the Dept. of Agriculture for about $19,000 a month, a saving of 23.6% over the rental formerly paid to IBM. This marks the beginning of a substantial business opportunity, for the Federal Government now rents more than $900 million worth of computers and punched card equipment, an investment more than three times the combined net worth of all data processing purchase-leaseback firms in business today.

(3) Most users installing third-generation equipment have had three or more years experience with computers, so they feel confident that the computer will play a continuing role in their organizations. Therefore they are less hesitant to enter into long-term leases on their new computers. Honeywell discovered this when it found that 75% of customers who were renting Series 200 computers accepted a three- or five-year lease contract when reduced monthly payments were offered.

(4) Computer manufacturers (including IBM), anxious to raise the percentage of their equipment being purchased, have set "purchase" quotas for their salesmen. The salesman, striving to reach this goal, often actively solicits the participation of a leasing firm for converting a customer to the "purchased machine" category.

On the other hand, purchase-leaseback firms currently have severe limitations on the amount of new business they can write for the very same reasons why customers

are not buying computers themselves:

(1) scarcity of investment capital,
(2) high interest rates, and
(3) suspension of the 7% investment tax credit.

Randolph Computer Corp. is typical of firms that are in this situation. The firm was started in April, 1965, to specialize in the leasing of 360 computer systems. Three of the principal executives in the company had considerable previous experience in computer leasing at Boothe Leasing, the former computer leasing subsidiary of Greyhound Corp. A fourth was a national account manager at IBM where he coordinated activities with computer leasing firms.

Randolph wrote its first 360 lease last winter and the value of equipment on lease grew rapidly to $7 million by April; $13.5 million by June. Now, the company has $24 million worth of 360's on lease to blue-chip firms such as Avco, ITT, Hunt Foods, U. S. Rubber, etc. Randolph's current equity will allow it to add only an additional $3 million in leases and it expects to do this by year-end.

Obviously, more capital is needed. Last month, however, when Randolph attempted to expand its capital with an offering of 100,000 shares of convertible preferred, it had to cancel the offering because of the tight money market. Currently, principals of the company report they are negotiating for an additional $10-12 million in financing from private sources, and appear optimistic about obtaining it. Also, payback on present equipment will be accelerated by 6%. The firm's contracts - which run for two or three years at 10% below IBM's monthly rental rate - have an escalation clause that allows raising the leasing rate if IBM changes rental rates. Thus, as a result of IBM's recent rate changes, Randolph will increase its leasing rates 3% on the 360 while taking advantage of the 3% reduction in purchase price.

The firm showed an impressive increase in earnings this past quarter thanks to the large increase in the amount of 360 equipment on lease. Earnings in the quarter ended September were $142,402, or 27¢ a share, on $1,114,260 gross income. Earnings for the first six months of '66 were only $41,042, or 8¢ per share, on gross income of $578,546. Earnings for the year should be close to 75¢ per share.

When current high interest rates lessen, and the availability of investment funds mount, firms leasing computing and data processing equipment should resume a high growth rate and have a bright and promising business outlook.

SDS ANNOUNCES THAT COBOL WILL BE EXTRA COST SOFTWARE FOR SIGMA 7

Separate pricing of software and hardware has been a much discussed possibility during recent years. Many customers, in particular the Federal Government, have advocated a clear separation in the price paid for software, rather than a price for a hardware-software package.

In the first industry move in this direction, SDS has just announced it will offer a major piece of software as a special cost option for the Sigma 7 computer. Its COBOL-65 compiler, which will not be available until the first half of 1968, will be sold for $20,000 or leased for $1000 a month for the first 24 months of use. Improvements and revisions will be provided without extra charge.

President Max Palevsky of SDS explained "many users of the Sigma 7 will not require the business capability provided by COBOL. By charging those who use it

an additional fee, we avoid penalizing customers for software they may not use." Paradoxically, most impacted customer will be the Dept. of Defense, which requires a COBOL compiler on all computers it acquires for general purpose applications.

It will be interesting to see how many other computer manufacturers follow this lead. Most manufacturers will probably continue to provide essential system software such as operating systems, executive routines, and basic assembly programs free with their equipment. However, software such as application-oriented packages, advanced compilers, and other special programming routines of interest only to a selection of users may well be priced separately.

30% ANNUAL GROWTH PREDICTED FOR PROCESS CONTROL MARKET

A 30% annual growth rate for the world process control market during the next five years is predicted by R. C. Berendsen, manager of G.E.'s Process Computer Business Section. This compares with 15-20% annual growth expected for the commercial computer market. GE is the world leader in the total number of process computers installed or on order.

Speaking at the recent 1966 Iron and Steel Show, Mr. Berendsen noted that "the process computer has formed a permanent niche for itself in management's thinking, and is becoming a pivotal factor in long-range industrial operations planning. The process computer market will more than quadruple by 1971, with a total market potential approaching $1 billion in this period." EDP I&MR estimates the 1966 process control market at $80 million in value of computers and accessory controls installed during the year.

The GE executive disclosed that recent marketing studies by his firm indicate that steel, petroleum, chemical and electric utilities industries combined represent about 75% of process computer sales at the current time. However, by 1971 petroleum and chemical firms are expected to enlarge their proportion of the process computer market, while electric utilities, although still a major user, will represent a smaller share. In addition, automobile, aerospace, transportation and food processing firms should show promising increases in process control computer purchases during the next five years, Mr. Berendsen predicted.

Computer manufacturers are not overlooking this market for system processors. Recently, Honeywell's Computer Control Div. announced its $25,000 DDP-516. This integrated circuit computer is the first of a new series of machines that is expected to double CCD's share of the small control computer market and, in three years, to bring the division to the $50 million sales level, twice the current level. Already, Digital Equipment Corp. is brimming with success in the instrumentation market with its PDP-8 and PDP-8/S, with over 500 units installed.

System computer manufacturers compete hotly for lush multi-machine orders. In announcing the 516, CCD says it has already delivered one of over 20 machines in a $1 million order from Stromberg-Carlson for data-recorder systems. And Scientific Data Systems has received one of its largest purchase orders ever announced - some $5 million of Sigma 2 computers and related equipment that Westinghouse Electric is buying for its Prodac 250 systems. Deliveries start this year.

INTERNATIONAL

France's "Plan Calcul", described in our Sept. 15th issue, has apparently provided sufficient evidence that France is determined to build super-scale computers if she cannot import them from the U.S. This commitment encouraged the Export

(Continued on last page)

MONTHLY COMPUTER CENSUS

The number of electronic digital computers installed or in production at any one time has been increasing at a bewildering pace in the past several years. New vendors have come into the market, and familiar machines have gone out of production. Some machines have been received with open arms by users -- others have been given the cold shoulder.

To aid readers of the EDP I&MR in keeping with this mushrooming activity, we compile and publish this monthly report on the number of general purpose electronic computers made by American-based companies which are installed or on order as of the preceding month. These figures included installations and orders outside the United States. We update this computer census monthly, so that it will serve as a "box score" of progress in following the growth of the American computer industry, and of the computing power it builds.

In general, manufacturers in the computer field do not officially release installation and on order figures. The figures in this table are developed through a continuing market survey conducted by our research staff. This market research program develops a documented data file on over 80% of the computer installations in the United States. A similar program is conducted for overseas installations.

Comments on this census from informed readers will be welcomed.

AS OF AUGUST 10, 1966

	NAME OF COMPUTER	SOLID STATE?	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS	NUMBER OF UNFILLED ORDERS
Advanced Scientific Instruments	ASI 210	Y	$3850	4/62	25	0
	ASI 2100	Y	$4200	12/63	7	0
	ADVANCE 6020	Y	$4400	4/65	11	5
	ADVANCE 6040	Y	$5600	7/65	6	4
	ADVANCE 6050	Y	$9000	2/66	2	6
	ADVANCE 6070	Y	$15,000	10/65	4	5
	ADVANCE 6130	Y	$1000	11/66	0	4
Autonetics	RECOMP II	Y	$2495	11/58	40	X
	RECOMP III	Y	$1495	6/61	8	X
Bunker-Ramo Corp.	BR-130	Y	$2000	10/61	162	2
	BR-133	Y	$2400	5/64	22	2
	BR-230	Y	$2680	8/63	15	X
	BR-300	Y	$3000	3/59	36	X
	BR-330	Y	$4000	12/60	34	X
	BR-340	Y	$7000	12/63	20	X
Burroughs	205	N	$4600	1/54	46	X
	220	N	$14,000	10/58	36	X
	E101-103	N	$875	1/56	135	X
	B100	Y	$2800	8/64	150	20
	B250	Y	$4200	11/61	85	1
	B260	Y	$3750	11/62	225	5
	B270	Y	$7000	7/62	155	12
	B280	Y	$6500	7/62	128	10
	B300	Y	$10,000	7/65	100	90
	B2500	Y	$5000	1/67	0	30
	B3500	Y	$14,000	5/67	0	21
	B5500	Y	$22,000	3/63	55	14
	B6500	Y	$33,000	2/68	0	3
	B8500	Y	$200,000	2/67	0	1
Computer Control Co.	DDP-24	Y	$2500	5/63	80	5
	DDP-116	Y	$900	4/65	100	35
	DDP-124	Y	$2050	3/66	12	40
	DDP-224	Y	$3300	3/65	35	5
Control Data Corporation	G-15	N	$1600	7/55	310	X
	G-20	Y	$15,500	4/61	23	X
	LGP-21	Y	$725	12/62	118	X
	LGP-30	semi	$1300	9/56	124	X
	RPC-4000	Y	$1875	1/61	55	X
	160*/160A/160G	Y	$2100/$4000/$12,000	5/60;7/61;3/64	453	2
	924/924A	Y	$11,000	8/61	26	X
	1604/1604A	Y	$45,000	1/60	59	X
	1700	Y	$4000	5/66	10	85
	3100	Y	$11,000	12/64	84	30
	3200	Y	$14,000	5/64	90	X
	3300	Y	$15,000	9/65	20	40
	3400	Y	$25,000	11/64	19	X
	3500	Y	$30,000	9/66	0	10
	3600	Y	$58,000	6/63	50	X
	3800	Y	$60,000	2/66	4	12
	6400	Y	$50,000	5/66	4	14
	6600	Y	$85,000	8/64	16	10
	6800	Y	$130,000	4/67	0	4
Data Machines, Inc.	620	Y	$900	11/65	9	32
Digital Equipment Corp.	PDP-1	Y	$3400	11/60	60	X
	PDP-4	Y	$1700	8/62	57	X
	PDP-5	Y	$900	9/63	114	1
	PDP-6	Y	$10,000	10/64	19	4
	PDP-7	Y	$1300	11/64	70	50
	PDP-8	Y	$525	4/65	350	250
El-tronics, Inc.	ALWAC IIIE	N	$1820	2/54	18	X
Electronic Associates, Inc.	8400	Y	$10,000	6/65	6	7
Friden	6010	Y	$600	6/63	440	80
General Electric	115	Y	$2200	12/65	110	500
	205	Y	$2900	6/64	44	X
	210	Y	$16,000	7/59	50	X
	215	Y	$6000	9/63	54	X
	225	Y	$10,000	4/61	205	X
	235	Y	$12,000	4/64	64	4
	415	Y	$7600	5/64	175	65
	425	Y	$9600	6/64	65	40
	435	Y	$14,000	9/65	25	18
	625/635	Y	$55,000	5/65	28	30
	645	Y	$150,000	7/66	0	10
Honeywell Electronic Data Processing	H-120	Y	$3500	1/66	150	280
	H-200	Y	$5700	3/64	820	140
	H-400	Y	$8500	12/61	119	X
	H-800	Y	$22,000	12/60	88	3
	H-1200	Y	$7300	2/66	12	65
	H-1400	Y	$14,000	1/64	12	X

NAME OF MANUFACTURER	NAME OF COMPUTER	SOLID STATE?	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS	NUMBER OF UNFILLED ORDERS
Honeywell (cont'd)	H-1800	Y	$35,000	1/64	17	2
	H-2200	Y	$13,000	1/66	15	50
	H-4200	Y	$20,500	11/67	0	6
	H-8200	Y	$35,000	3/68	0	2
	DATAmatic 1000	N	$40,000	12/57	3	X
IBM	305	N	$3600	12/57	150	X
	360/20	Y	$1800	12/65	350	6400
	360/30	Y	$7500	5/65	1600	4500
	360/40	Y	$15,000	4/65	790	1500
	360/44	Y	$10,000	9/66	1	120
	360/50	Y	$26,000	8/65	100	550
	360/62	Y	$55,000	11/65	1	X
	360/65	Y	$50,000	11/65	14	200
	360/67	Y	$75,000	9/66	0	60
	360/75	Y	$78,000	2/66	6	30
	360/90 Series	Y	$140,000	6/67	0	9
	650	N	$4800	11/54	180	X
	1130	Y	$1200	11/65	325	3600
	1401	Y	$6600	9/60	6700	250
	1401-G	Y	$1900	5/64	1575	50
	1410	Y	$14,200	11/61	780	100
	1440	Y	$4800	4/63	3100	300
	1460	Y	$9000	10/63	1800	100
	1620 I, II	Y	$4000	9/60	1700	30
	1800	Y	$7600	1/66	25	275
	701	N	$5000	4/53	1	X
	7010	Y	$22,600	10/63	205	5
	702	N	$6900	2/55	6	X
	7030	Y	$160,000	5/61	6	X
	704	N	$32,000	12/55	33	X
	7040	Y	$22,000	6/63	120	4
	7044	Y	$32,000	6/63	120	5
	705	N	$38,000	11/55	54	X
	7070, 2, 4	Y	$27,000	3/60	330	X
	7080	Y	$55,000	8/61	85	X
	709	N	$40,000	8/58	9	X
	7090	Y	$63,500	11/59	46	X
	7094	Y	$72,500	9/62	124	2
	7094 II	Y	$78,500	4/64	120	8
Monroe Calculating Machine Co.	Monrobot XI	Y	$700	12/60	480	100
National Cash Register Co.	NCR - 304	Y	$14,000	1/60	26	X
	NCR - 310	Y	$2500	5/61	20	X
	NCR - 315	Y	$8500	5/62	390	30
	NCR - 315-RMC	Y	$12,000	9/65	42	70
	NCR - 390	Y	$1850	5/61	1000	70
	NCR - 500	Y	$1500	10/65	400	650
Philco	1000	Y	$7010	6/63	20	X
	2000-210, 211	Y	$40,000	10/58	18	X
	2000-212	Y	$52,000	1/63	11	X
Radio Corporation of America	RCA 301	Y	$7000	2/61	647	4
	RCA 3301	Y	$17,000	7/64	54	12
	RCA 501	Y	$14,000	6/59	99	X
	RCA 601	Y	$35,000	11/62	5	X
	Spectra 70/15	Y	$3500	9/65	50	110
	Spectra 70/25	Y	$5700	9/65	28	60
	Spectra 70/35	Y	$9000	11/66	0	75
	Spectra 70/45	Y	$15,000	11/65	10	120
	Spectra 70/55	Y	$30,000	7/66	0	12
Raytheon	250	Y	$1200	12/60	175	X
	440	Y	$3500	3/64	15	3
	520	Y	$3200	10/65	14	6
Scientific Control Systems	650	Y	$500	5/66	1	8
	655	Y	$1800	10/66	0	2
	660	Y	$2000	10/65	3	3
	670	Y	$2600	5/66	1	2
Scientific Data Systems Inc.	SDS-92	Y	$1500	4/65	53	35
	SDS-910	Y	$2000	8/62	180	5
	SDS-920	Y	$2900	9/62	126	11
	SDS-925	Y	$3000	12/64	24	17
	SDS-930	Y	$3400	6/64	120	25
	SDS-940	Y	$10,000	4/66	4	13
	SDS-9300	Y	$7000	11/64	27	7
	Sigma 2	Y	$1000	2/67	0	9
	Sigma 7	Y	$12,000	12/66	0	20
Systems Engineering Labs	SEL-810	Y	$1000	9/65	23	8
	SEL-840	Y	$1400	11/65	3	5
UNIVAC	I & II	N	$25,000	3/51 & 11/57	28	X
	III	Y	$20,000	8/62	80	X
	File Computers	N	$15,000	8/56	18	X
	Solid-State 80 I, II, 90 I, II & Step	Y	$8000	8/58	265	X
	418	Y	$11,000	6/63	85	38
	490 Series	Y	$35,000	12/61	102	60
	1004	Y	$1900	2/63	3300	100
	1005	Y	$2400	4/66	80	200
	1050	Y	$8000	9/63	280	50
	1100 Series (except 1107)	N	$35,000	12/50	11	X
	1107	Y	$55,000	10/62	29	X
	1108	Y	$65,000	9/65	16	40
	9200	Y	$1500	6/67	0	100
	9300	Y	$3400	6/67	0	40
	LARC	Y	$135,000	5/60	2	X
				TOTALS	35,199	22,384

X = no longer in production.

* To avoid double counting, note that the Control Data 160 serves as the central processor of the NCR 310. Also, many of the orders for the IBM 7044, 7074, and 7094 I and II's are not for new machines but for conversion from existing 7040, 7070, and 7090 computers respectively.

STOCK MARKET REPORT ON SELECTED EDP FIRMS

September 9, 1966 - October 7, 1966

	1966 High	1966 Low	4 weeks Sales in 100's	4 weeks High	4 weeks Low	Last	4 weeks Net Change	4 weeks % Change
NEW YORK STOCK EXCHANGE								
Addressograph-Multigraph	77 3/8	51 1/2	2412	65 1/2	54 1/4	55 1/4	+1/4	+0.45
American R & D	44 3/4	20 1/4	766	35 7/8	27 5/8	27 5/8	-4 1/8	-8.70
Ampex Corp.	27 5/8	17	4269	23 5/8	17 3/8	17 5/8	-3 7/8	-18.02
Burroughs	88 1/2	49 1/4	8683	78 3/8	60 3/8	62 7/8	-10 3/8	-14.16
Collins Radio	85 3/8	37 5/8	5996	66 1/4	37 5/8	39 5/8	-20 7/8	-34.50
Control Data	39 1/4	26 3/8	10,933	37 7/8	28	28 7/8	-3 3/8	-10.46
Electronic Assoc.	27 1/8	13	773	17 3/8	13	13	-2 1/2	-16.13
General Electric	120	80	5331	90 3/4	81 1/4	85 3/8	+4 3/8	+5.40
Honeywell	96	58 1/4	2098	65 1/2	58 1/4	60	-4 1/2	-6.98
IBM	375	292	2619	338 1/2	292	292 5/8	-22 3/8	-7.10
Inter. Tel & Tel	79 3/8	58 1/2	1946	68 1/4	58 1/2	58 1/2	-6	-9.30
Litton	86 1/2	57 3/8	4981	65 7/8	57 3/8	58	-3 3/4	-6.07
Nat Cash Register	91 1/2	59	948	70 1/2	59	59 1/2	-10 1/2	-15.00
RCA	62 1/4	36 3/4	7823	47	36 3/4	36 3/4	-6 1/2	-15.02
Raytheon	56 7/8	36	15,854	56 7/8	41 1/4	41 7/8	-7 3/8	-14.97
Scientific Data	81 1/8	41 1/4	2876	64 5/8	41 1/4	42 5/8	-16 7/8	-28.36
SCM	91 7/8	42 5/8	12,012	65 5/8	42 5/8	44 1/8	-14 3/8	-24.57
Singer	64 3/4	39 5/8	1333	45	39 5/8	39 5/8	-3 1/8	-7.31
Sperry Rand	33 5/8	17 1/8	23,588	29 7/8	20 5/8	21 1/8	-7	-24.89
Teledyne	133	50 3/8	4278	81 1/2	50 3/8	52 1/2	-21	-28.57
NYSE COMPUTER STOCK AVERAGE							-8.19	-14.20
AMERICAN STOCK EXCHANGE								
ANelex	28	8	470	11 1/4	8 1/4	8 1/4	-1/4	-2.94
Audio Devices, Inc.	41 1/4	21 7/8	528	35	23	24	-7 3/8	-23.50
Bunker-Ramo	10 1/2	4 3/4	1879	7 1/4	4 3/4	4 3/4	-2 1/2	-34.48
Cal Comp	28 1/4	13 1/4	496	27 1/4	18 1/4	18 1/2	-7 3/8	-28.50
Clary	8	3 5/8	170	5 1/8	3 5/8	3 5/8	-1	-21.62
Computer Application	26 1/4	11 3/8	150	14 1/2	11 3/8	11 3/8	-1 7/8	-14.15
Computer Science	37 1/4	17 1/4	825	27	17 1/4	17 3/8	-8	-31.53
Levin-Townsend Comp Corp	26 7/8	12	207	18 7/8	12	12	-4 3/4	-28.36
Milgo Electronics	8 7/8	4	89	4 3/4	4	4	-3/4	-15.79
Planning Research	36 1/2	13 3/8	178	18 1/4	13 3/8	13 5/8	-3 3/4	-21.58
Potter Instrument	26 3/8	10 5/8	311	13 1/4	10 5/8	11	-1 3/4	-13.72
AMEX COMPUTER STOCK AVERAGE							-3.58	-21.47

OVER-THE-COUNTER	1966 High Bid	1966 Low Bid	October 7 Bid	October 7 Asked	4 weeks ago Bid
Applied Data Research, Inc.	3 3/4	2 1/4	2 1/4	2 7/8	3 1/2
Aries Corp.	8 1/2	3	7	7 1/2	7 1/4
Automatic Data Processing	50	29 1/2	31 1/2	34 1/2	32
Bolt, Beranek & Newman, Inc.	16	7 1/2	9	9 3/8	8 1/2
C-E-I-R	15 1/4	5 7/8	5 7/8	6 3/8	6 1/8
Computer Usage	24 1/2	16 3/4	18	19 7/8	17 1/4
Data Products	4	2 3/8	2 1/2	2 7/8	3
Digital Equipment	26	18	18	18 1/2	23 3/4
Digitronics	12 3/4	5 1/2	5 1/2	6	5 7/8
Documentation, Inc.	8 1/2	4 1/8	4 1/8	4 5/8	5 3/8
DPA, Inc.	19 7/8	6 3/8	7	7 3/4	7
Electronic Memories	26	13	13	13 3/4	17
Fabri-Tek	26	7 1/8	7 1/8	7 5/8	9 1/4
Informatics, Inc.	8 1/2	7 3/4	8 1/2	9 1/2	7 3/4
Leasco Data Proc Equip Corp	38 1/4	19 1/2	25 1/2	26	33
Management Assistance	45 3/4	20 3/8	20 3/8	20 7/8	27
Memorex	64 1/2	31 1/2	43	44 1/2	53 1/4
Mohawk Data Sciences	46	19	21 1/2	22 1/2	22 1/2
Randolph Computer Corp	21 3/4	10 1/2	11	12 1/4	13 1/2
Recognition Equipment, Inc.	72	37	37	41 3/4	46
Systems Engineering Labs			4 7/8	5 3/8	4 7/8
University Computing Co.	28 1/2	9 5/8	13 1/2	14 1/2	21 1/4

(Continued from Page 5)

Office of the U.S. Dept. of Commerce to grant long withheld licenses for export of three Control Data 6600 computers to France. For her part, France has guaranteed that the computers will not be used directly for nuclear weapons development that would violate U.S. commitments under the Nuclear Test Ban Treaty. The three CDC machines, valued at close to $15 million, will be leased by the French. The French Government is also believed to be interested in ordering a 360/90, IBM's super-scale computer. This move suggests that France will suspend her plans under which the French Government had appropriated $100 million for a consortium of French computer manufacturers to develop large scientific computers.

October 25, 1966 Vol. 2, No. 11

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E|D|P
INDUSTRY AND
MARKET REPORT

A SEMI-MONTHLY NEWSLETTER FOR EXECUTIVES
IN THE ELECTRONIC DATA PROCESSING INDUSTRY,
AND THE FINANCIAL COMMUNITY.

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GENERAL-PURPOSE COMPUTERS FIND GROWING MARKET IN TYPESETTING; NUMBER OF SYSTEMS QUADRUPLE IN TWO YEARS

The number of computers used in typesetting applications has increased over four times in the last two years, from 70 to 292, according to a recent survey released by Composition Information Services (CIS), Inc.

CIS reports that computerized typesetting installations are now found in 42 U.S. states and in 18 countries throughout the world. Newspapers represent the largest user group, with 63% of the installations. Printers and specialized typesetting houses follow with 23% and 5% respectively. Applications range from the routine processing of unjustified tape to the creation of fully formatted control tapes to drive sophisticated photocomposition machines making up full pages.

Although special-purpose computers launched the commercial development of computer typesetting applications in the early part of this decade, general-purpose systems have been capturing a growing share of the market due to their decreased cost and the compatibility they can offer with the user's administrative data processing equipment. In the U.S. and Canada, general-purpose computers account for 53% of the systems in use, and 57% of the systems on order. In contrast, only 30% of the typesetting computers used in other countries are general-purpose.

All major American digital computer manufacturers are now active in the typesetting market. As indicated in Table 1, IBM leads the field with 73 installations, and 19 1130's and one 360 on order. In second place is Digital Equipment, with 21 of its PDP-8 systems in use and 5 on order. RCA has ten 301 systems and two Newscom 30 systems in use for typesetting. Control Data has six installations of its 8050 typesetting unit, which is built around a CDC 160 computer.

A summary of the results of the survey is presented in Table 1. The complete survey results include a listing of the names and locations of users of each specific model of equipment, a geographical breakdown of all graphic arts organizations using computers for typesetting, and a description of the particular typesetting or photocomposition equipment associated with each installation. Persons interested in the full results of the survey and/or in the activities of CIS should write to Composition Information Services, 1605 N. Cahuenga Blvd., Los Angeles, Calif. 90028.

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TABLE 1

CIS SURVEY OF COMPUTERIZED TYPESETTING

Computer Systems	U.S. & CANADA		INTERNATIONAL		TOTAL		CLASSIFICATIONS OF USERS*						
	Users	Orders	Users	Orders	Users	Orders	Newspapers	Printers	Typesetters	Publishers	Centers	Government	Educational
BULL-GENERAL ELECTRIC				1		1	1						
BURROUGHS 220 SYSTEMS	1				1							1	
COMPUGRAPHIC DTP	13				13			13					
CONTROL DATA SYSTEMS	5		1		6		5		1				
DELCO JUSTIFIER	1				1		1						
DIGITAL EQUIPMENT PDP-8	20	5	1		21	5	22	2			2		
ELLIOTT-AUTOMATION LTD.			1	2	1	2	2	1					
FAIRCHILD COMPUSET	6		1	1	7	1	6	1	1				
GENERAL ELECTRIC	1				1			1					
GUTTINGER GSA/MONOTRON		1	13	3	13	4	2	13	2				
HELLCOM SYSTEMS			2	3	2	3	2	3					
HONEYWELL H-200 SYSTEMS	10	5			10	5	5	6		3		1	
HONEYWELL SYSTEMS	4	1	1		5	1	4	1				1	
IBM 1620 SYSTEMS	28				28		18	7	2				1
IBM 1130 SYSTEMS	22	19			22	19	35	3	2	1			
IBM 1400 SERIES	8		6		14		5	3		1	2	3	
IBM 709/7090 SYSTEMS	4				4					1		1	2
IBM SYSTEM/360	3	1	2		5	1	3	2				1	
ICT SYSTEMS			2	3	2	3		3			2		
INTERTYPE COMPUTERS	15		2		17		11	3	3				
MERGENTHALER LINASEC	41	1	24	1	65	2	48	15	4				
MERGENTHALER JUSTAPE	34	27		1	34	28	54	5	2	1			
NCR 315 SYSTEMS	1				1		1						
RCA 301 SYSTEMS	10				10		4	2		2	2		
RCA 30 NEWSCOM	2				2		2						
RCA SPECTRA 70		5				5	1	1	1	2			
RCA SYSTEMS (MISC.)	1	1			1	1		1		1			
SCIENTIFIC DATA SYSTEMS	1				1		1						
SIEMENS/HELL 3003			1	1	1	1	1	1					
STAR PARTS AUTOCOMP	1				1		1						
UNIVAC SYSTEMS	2		1		3						1	2	
Totals	234	66	58	16	**292**	**82**	235	87	18	12	9	10	3
							63%	23%	5%	3.2%	2.4%	2.6%	0.8%

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*Systems installed and on order, including U.S., Canada and International

NEWS BYTES

Business Information Technology (BIT), Inc., a new firm located in Natick, Mass., has become the second firm to introduce a computer selling for under $10K (Digital Equipment, with its PDP-8/S, was first). BIT's 480 Processor has a memory size of 1K to 64K bytes (10 bits per byte), with a cycle time of 8 usec. A 2 usec. memory is available as an option. The machine is designed principally as a data communications processor, or an industrial process controller. It features four I/O data channels, three with simultaneous compute capability. A basic assembly language is provided as software. Selling price begins at $9.5K.

Two units have already been delivered, and two others are expected to be shipped by the first of the year. Total backlog is put at eight units. All units have been sold on an OEM basis.

BIT, which has Potter Instrument as a major investor, expects to use the 480 as the basis for a 900 series of data communication terminals. One version, a 901, will be a slave printer terminal selling for under $16K. Other versions will be designed to use the Potter chain printer, a magnetic tape transport, or a card reader-punch unit. BIT also expects to equip the magnetic tape terminal version with a keyboard so that it can be used as a data transcriber similar to the unit produced by Mohawk Data Sciences.

Cheaper by the half-dozen. Travelers Insurance Company has ordered six Burroughs B300 computers to add to its already impressive installation complex. The new systems will join 19 others already installed. Burroughs, IBM, RCA, and UNIVAC machines are represented. When the B300's go into operation in April of next year, they will contribute to a work load resulting in 4,000 monthly reports. The Travelers' data processing activity involves use of nearly one-half billion punched cards each year, and the running of 2300 separate computer programs.

Computer in a suitcase. . .Dial-a-DataCenter . . .Traveling man's console. . are some of the possibilities suggested by the portable remote computer terminals being placed on the market. One such device, offered by Tymshare, Inc., a west coast-based time-sharing computer service, uses a Model 33 or Model 35 Teletype coupled to a regular telephone set via an Audio Magnetic Data Transceiver. The Transceiver sells for $475; with a Teletype Model 33 terminal and an interface adapter, the total package costs just over $1500. The computer itself receives the terminal-originated signals over telephone lines, through a Model 103AII Dataset. By simply dialing the number of the computer from the telephone and placing a telephone headset on the Audio Magnetic Data Transceiver, information can be transferred to and from the terminal device and the computer over standard telephone lines.

Control Data Corporation has received an order for a second 6600 system from the Applied Mathematics Department of Brookhaven National Laboratories. Included in the new system is a one million extended core storage unit, which will be shared between the new system and the 6600 already installed. Also, CDC recently installed a 6400 system at the Computer Center of the University of California's Berkeley campus. The new system is being purchased by the University to replace a coupled IBM 7094/7040 system.

Digital Equipment Corp., brimming with success in the market for small computers for scientific instrumentation (650 PDP-8's, 300 PDP/S's sold), has recommitted itself to the medium-scale computer field. DEC had only limited sales success and high programming and engineering expenses with its last medium-scale

computer, the PDP-6. However, the company hopes to get extended mileage out of this investment by taking the best engineering features of the 6 and creating a program compatible, integrated circuit successor to the 6, called the PDP-10. The new machine, first shown off at the recent Fall Joint Computer Conference, offers a broad range of building blocks of both instruction units and peripherals. The new system ranges from an instrumentation computer in the performance class of the Sigma 7 to a full blown time-sharing system with PDP-8's as remote terminal controllers. Purchase prices start at $110K for min. configurations (8K 36-bit words) and go up to $1 million for full time-sharing systems (32K 36-bit words). DEC foresees that the 10 will help it hold the large share it now has of the market for computers in physics research. As scientific apparati in the laboratory require faster and more capable computers to record and analyze sensor readings on an on-line basis, machines the size and performance class of the PDP-10 are needed. First PDP-10 order is from Project MAC.

Digital Equipment reports sales of $7,409,000 and profits of $844,000, or 29¢ per share, for the quarter ended October 1st. President Ken Olsen predicts that sales in fiscal 67, ending July 1st, should set record highs. For the past fiscal year sales totalled $22,776,434, and earnings were $1,950,540, or 73¢ per share.

DEC was recently listed on the American Stock Exchange. The company made its first public stock offering in August. American R&D, a Boston-based venture capital firm, holds 60% of the outstanding stock.

NCR, the only major computer manufacturer which has not yet announced a new generation product line, is expected shortly to announce a 615 series. The line will include three processors - dubbed the 100, 200, and 400. Each system will have a rod memory similar to that on the NCR 315RMC, but speeded up to a snappy 0.8-microsecond cycle time. Smallest in the line, the 615/100, will have 8-16K bytes of memory and rent for $1.5-6K a month. This machine is intended for batch processing, but will have a dash of real-time interrupt mode processing capability. Middle machine in the line, the 615/200, covers the range between 32-256K bytes of memory and will rent in the $4-24K a month range. It is designed for both batch and real-time environments and can have multi-programming capability as an optional feature. At the top of the line is the 615/400, with 64-512K bytes of memory and a monthly rental range from $10-50K. It will have full time-sharing and a multi-magnetic card memory, a 3000 lpm printer, and disc packs. When the 615's are delivered, starting in early 1968, we expect NCR to have both a 315 and an IBM 1401 emulator.

This line should put NCR in a good competitive position with respect to IBM, Burroughs, and Honeywell, its principal competitors for data processing sales among the retail trades and financial institutions. In addition, the growth potential of the 615 series should protect NCR's position vis-a-vis the current 400-odd users of its 315 computer systems.

NCR is glowing over a record volume of computer orders received during the first nine months of this year. Total sales value of the orders exceeded $100 million and were 55% ahead of the same period last year. However, NCR chairman Robert S. Oelman pointed out that most of the orders were for rentals, not for outright sales. The increased demand, he said, was concentrated in the company's 500 line and its 315 systems. NCR's domestic marketing division achieved its annual sales quota by the end of late July, and its international division by the end of September.

Scientific Data Systems has increased the purchase and lease price of its 900 series computers about 5% for typical configurations, effective December 15th. Since most 900 series computers have already been purchased, the move is seen as mainly an effort to encourage new customers to order SDS's Sigma series, rather than continuing the production of the 900 series units, which are nearing the end of their competitive market life.

Last January we predicted that 1966 would prove the year "in which the performance and payoff obtained from the super-scale computer demonstrates that the industry hasn't matured much beyond the STRETCH stage." The industry leaders in large machines helpfully are confirming this observation. In May IBM announced a $15 million write-off on circuitry for its 360/90 super-scale computer series. Control Data has been plagued by persistent hardware and software problems on its 6000 series. And now GE finds that its super-scale 600 series is being bounced by a multi-system customer, the Martin Company. Martin is expelling three dual-processor GE 635's (about $12 million worth of equipment) because uptime has been well below 85-90%, the GECOS operating system has been working poorly, and system speed at some sites has reportedly been slower than the IBM 7094's the equipment replaced. Other 600 users report similar, although less severe, difficulties. Martin is expected to swing back to IBM with 360/65's coupled to model 40's as satellites. GE, however, expects to be out from under its major problems on the 600 by the first of the year.

The slower pace of customer acceptance of GE computers has resulted in "imbalances in business operations" leading to layoffs of 450 employees at GE's Phoenix plant where its general purpose computers are made, and an additional 200 employees at its Oklahoma City plant where peripheral equipment and memory units are assembled. The Phoenix layoffs are mostly "overhead" personnel in planning, financial, office functions (about 350 of some 1750 white-collar personnel). Oklahoma City layoffs are most female assemblers of core memory units. The Phoenix layoff reduces that plant's employment by some 13% to 5500 persons. The Oklahoma layoff reduces that plant's employment by some 12% to 1500.

UNIVAC is finding that its 1108 I/II computer, announced over two years ago, is proving to be a real sales hit sleeper in the large-scale computer market. Fast, high capacity drum storage contributes to the 1108's very impressive performance on FORTRAN compilation. Software, tested and debugged for four years on the 1107, is probably the best available for demonstration at this time in the class of the IBM 360/65 and 75, the GE 600 series, and Control Data 6000 series. And such benchmark demonstrations can bring home the bacon on key government orders. The 1108 FORTRAN compiler is rated as producing some of the most efficient object codes in the business. The 1108 has captured over 70 orders, including 4 systems at NASA Houston, 2 for North American Aviation, 5 for Marshall Space Flight Center in Huntsville, 2 at United Aircraft, 3 for United Airlines, 2 for Air France, Boeing, Westinghouse, du Pont, Lockheed, General Dynamics, etc. Original projection was for sale of about 40 systems. It now looks like over 100 will be installed during the 1108's market life.

Sperry Rand's president, J. Frank Forster, reports that the Univac division is continuing to operate in the black, and that sales of its new 9000 series are "very good". Rental prices on the two announced models of this line, the 9200 and 9300, were recently increased to encourage a higher percentage of customers to purchase or take long-term leases. Announcement of details on the medium-scale 9500 system is expected later this fall.

MONTHLY COMPUTER CENSUS

The number of electronic digital computers installed or in production at any one time has been increasing at a bewildering pace in the past several years. New vendors have come into the market, and familiar machines have gone out of production. Some machines have been received with open arms by users -- others have been given the cold shoulder.

To aid readers of the EDP I&MR in keeping with this mushrooming activity, we compile and publish this monthly report on the number of general purpose electronic computers made by American-based companies which are installed or on order as of the preceding month. These figures included installations and orders outside the United States. We update this computer census monthly, so that it will serve as a "box score" of progress in following the growth of the American computer industry, and of the computing power it builds.

In general, manufacturers in the computer field do not officially release installation and on order figures. The figures in this table are developed through a continuing market survey conducted by our research staff. This market research program develops a documented data file on over 80% of the computer installations in the United States. A similar program is conducted for overseas installations.

Comments on this census from informed readers will be welcomed.

AS OF SEPTEMBER 10, 1966

NAME OF MANUFACTURER	NAME OF COMPUTER	SOLID STATE?	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS	NUMBER OF UNFILLED ORDERS
Advanced Scientific Instruments	ASI 210	Y	$3850	4/62	25	0
	ASI 2100	Y	$4200	12/63	7	0
	ADVANCE 6020	Y	$4400	4/65	12	4
	ADVANCE 6040	Y	$5600	7/65	6	4
	ADVANCE 6050	Y	$9000	2/66	3	6
	ADVANCE 6070	Y	$15,000	10/65	4	5
	ADVANCE 6130	Y	$1000	11/66	0	4
Autonetics	RECOMP II	Y	$2495	11/58	39	X
	RECOMP III	Y	$1495	6/61	8	X
Bunker-Ramo Corp.	BR-130	Y	$2000	10/61	162	2
	BR-133	Y	$2400	5/64	22	20
	BR-230	Y	$2680	8/63	15	X
	BR-300	Y	$3000	3/59	36	X
	BR-330	Y	$4000	12/60	34	X
	BR-340	Y	$7000	12/63	20	X
Burroughs	205	N	$4600	1/54	45	X
	220	N	$14,000	10/58	35	X
	E101-103	N	$875	1/56	133	X
	B100	Y	$2800	8/64	155	18
	B250	Y	$4200	11/61	85	1
	B260	Y	$3750	11/62	228	5
	B270	Y	$7000	7/62	160	8
	B280	Y	$6500	7/62	130	8
	B300	Y	$10,000	7/65	105	90
	B2500	Y	$5000	1/67	0	34
	B3500	Y	$14,000	5/67	0	23
	B5500	Y	$22,000	3/63	57	14
	B6500	Y	$33,000	2/68	0	5
	B8500	Y	$200,000	2/67	0	1
Control Data Corporation	G-15	N	$1600	7/55	310	X
	G-20	Y	$15,500	4/61	23	X
	LGP-21	Y	$725	12/62	118	X
	LGP-30	semi	$1300	9/56	124	X
	RPC-4000	Y	$1875	1/61	55	X
	160*/160A/160G	Y	$2100/$4000/$12,000	5/60;7/61;3/64	455	8
	924/924A	Y	$11,000	8/61	26	X
	1604/1604A	Y	$45,000	1/60	59	X
	1700	Y	$4000	5/66	13	90
	3100	Y	$11,000	12/64	88	30
	3200	Y	$14,000	5/64	90	X
	3300	Y	$15,000	9/65	23	40
	3400	Y	$25,000	11/64	19	X
	3500	Y	$30,000	9/66	0	11
	3600	Y	$58,000	6/63	50	X
	3800	Y	$60,000	2/66	5	14
	6400	Y	$50,000	5/66	6	15
	6600	Y	$85,000	8/64	18	11
	6800	Y	$130,000	4/67	0	4
Data Machines, Inc.	620	Y	$900	11/65	20	30
Digital Equipment Corp.	PDP-1	Y	$3400	11/60	60	X
	PDP-4	Y	$1700	8/62	57	X
	PDP-5	Y	$900	9/63	114	1
	PDP-6	Y	$10,000	10/64	20	4
	PDP-7	Y	$1300	11/64	80	50
	PDP-8	Y	$525	4/65	400	250
	PDP-9	Y	$1000	12/66	0	20
El-tronics, Inc.	ALWAC IIIE	N	$1820	2/54	17	X
Electronic Associates, Inc.	8400	Y	$10,000	6/65	7	7
Friden	6010	Y	$600	6/63	440	80
General Electric	115	Y	$2000	12/65	125	550
	205	Y	$2900	6/64	44	X
	210	Y	$16,000	7/59	50	X
	215	Y	$6000	9/63	54	X
	225	Y	$8000	4/61	205	X
	235	Y	$10,900	4/64	66	3
	415	Y	$9600	5/64	179	64
	425	Y	$18,000	6/64	68	42
	435	Y	$25,000	9/65	28	18
	625/635	Y	$55,800	5/65	33	32
	645	Y	$90,000	7/66	1	10
Honeywell Electronic Data Processing	DDP-24	Y	$2500	5/63	80	5
	DDP-116	Y	$900	4/65	100	40
	DDP-124	Y	$2050	3/66	12	40
	DDP-224	Y	$3300	3/65	35	10
	H-120	Y	$3500	1/66	190	280
	H-200	Y	$5700	3/64	855	140
	H-400	Y	$8500	12/61	118	X
	H-800	Y	$26,000	12/60	89	3
	H-1200	Y	$7300	2/66	16	68
	H-1400	Y	$14,000	1/64	12	1

NAME OF MANUFACTURER	NAME OF COMPUTER	SOLID STATE?	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS	NUMBER OF UNFILLED ORDERS
Honeywell (cont'd)	H-1800	Y	$35,000	1/64	17	2
	H-2200	Y	$13,000	1/66	12	52
	H-4200	Y	$20,500	11/67	0	6
	H-8200	Y	$35,000	3/68	0	2
	DATAmatic 1000	N	$40,000	12/57	3	X
IBM	305	N	$3600	12/57	148	X
	360/20	Y	$2000	12/65	500	6300
	360/30	Y	$7500	5/65	1800	4600
	360/40	Y	$15,000	4/65	900	1500
	360/44	Y	$10,000	7/66	2	125
	360/50	Y	$26,000	8/65	106	560
	360/62	Y	$55,000	11/65	1	X
	360/65	Y	$50,000	11/65	17	205
	360/67	Y	$75,000	9/66	0	60
	360/75	Y	$78,000	2/66	8	30
	360/90 Series	Y	$140,000	6/67	0	9
	650	N	$4800	11/54	178	X
	1130	Y	$1200	11/65	350	3700
	1401	Y	$6600	9/60	6750	X
	1401-G	Y	$2300	5/64	1560	50
	1410	Y	$14,200	11/61	790	90
	1440	Y	$4800	4/63	3100	300
	1460	Y	$11,500	10/63	1775	80
	1620 I, II	Y	$4000	9/60	1680	20
	1800	Y	$7600	1/66	30	275
	701	N	$5000	4/53	1	X
	7010	Y	$22,600	10/63	208	6
	702	N	$6900	2/55	6	X
	7030	Y	$160,000	5/61	6	X
	704	N	$32,000	12/55	32	X
	7040	Y	$22,000	6/63	120	4
	7044	Y	$32,000	6/63	121	5
	705	N	$38,000	11/55	52	X
	7070, 2, 4	Y	$27,000	3/60	328	X
	7080	Y	$55,000	8/61	85	X
	709	N	$40,000	8/58	9	X
	7090	Y	$63,500	11/59	45	X
	7094	Y	$72,500	9/62	120	2
	7094 II	Y	$78,500	4/64	124	8
Monroe Calculating Machine Co.	Monrobot XI	Y	$700	12/60	480	100
National Cash Register Co.	NCR - 304	Y	$14,000	1/60	26	X
	NCR - 310	Y	$2500	5/61	20	X
	NCR - 315	Y	$8500	5/62	345	35
	NCR - 315-RMC	Y	$12,000	9/65	45	75
	NCR - 390	Y	$1850	5/61	1030	50
	NCR - 500	Y	$1500	10/65	430	850
Philco	1000	Y	$7010	6/63	18	X
	2000-210, 211	Y	$40,000	10/58	16	X
	2000-212	Y	$52,000	1/63	10	X
Radio Corporation of America	RCA 301	Y	$7000	2/61	645	2
	RCA 3301	Y	$17,000	7/64	60	10
	RCA 501	Y	$14,000	6/59	97	X
	RCA 601	Y	$35,000	11/62	5	X
	Spectra 70/15	Y	$3500	9/65	55	105
	Spectra 70/25	Y	$5700	9/65	30	55
	Spectra 70/35	Y	$9000	7/66	3	80
	Spectra 70/45	Y	$15,000	11/65	11	110
	Spectra 70/55	Y	$30,000	7/66	0	12
Raytheon	250	Y	$1200	12/60	175	X
	440	Y	$3500	3/64	16	3
	520	Y	$3200	10/65	15	6
Scientific Control Systems	650	Y	$500	5/66	1	8
	655	Y	$1800	10/66	0	2
	660	Y	$2000	10/65	4	3
	670	Y	$2600	5/66	1	2
Scientific Data Systems, Inc.	SDS-92	Y	$1500	4/65	58	33
	SDS-910	Y	$1200	8/62	182	6
	SDS-920	Y	$2900	9/62	130	12
	SDS-925	Y	$3000	12/64	25	10
	SDS-930	Y	$3400	6/64	120	20
	SDS-940	Y	$10,000	4/66	5	12
	SDS-9300	Y	$7000	11/64	27	7
	Sigma 2	Y	$1000	2/67	0	35
	Sigma 7	Y	$12,000	12/66	0	22
Systems Engineering Labs	SEL-810/810A	Y	$1000	9/65	24	8
	SEL-840/840A	Y	$1400	11/65	3	5
UNIVAC	I & II	N	$25,000	3/51 & 11/57	27	X
	III	Y	$20,000	8/62	78	X
	File Computers	N	$15,000	8/56	16	X
	Solid-State 80 I,II, 90 I, II & Step	Y	$8000	8/58	262	X
	418	Y	$11,000	6/63	88	40
	490 Series	Y	$35,000	12/61	105	60
	1004	Y	$1900	2/63	3250	70
	1005	Y	$2400	4/66	300	280
	1050	Y	$8000	9/63	280	50
	1100 Series (except 1107)	N	$35,000	12/50	11	X
	1107	Y	$55,000	10/62	29	X
	1108	Y	$65,000	9/65	18	44
	9200	Y	$1500	6/67	0	250
	9300	Y	$3400	6/67	0	50
	LARC	Y	$135,000	5/60	2	X
				TOTALS	36,145	22,736

X = no longer in production

* To avoid double counting, note that the Control Data 160 serves as the central processor of the NCR 310. Also, many of the orders for the IBM 7044, 7074, and 7094 I and II's are not for new machines but for conversion from existing 7040, 7070, and 7090 computers respectively.

STOCK MARKET REPORT ON SELECTED EDP FIRMS

October 7 - 21, 1966

NEW YORK STOCK EXCHANGE	1966 High	1966 Low	2-weeks Sales in 100's	2-weeks High	2-weeks Low	Last	2-weeks Net Change	2-weeks % Change
Addressograph-Multigraph	77 3/8	51 1/2	1122	62	51 3/4	58	+2 3/4	+4.98
American R&D	44 3/4	20 1/4	407	34 1/4	27	31 1/8	+3 1/2	+14.75
Ampex Corp.	27 5/8	17	1701	19 1/2	17 1/4	18 3/4	+1 1/8	+6.38
Burroughs	88 1/2	49 1/4	4199	71 3/8	60 3/8	65 3/4	+2 7/8	+4.57
Collins Radio	85 3/8	37 5/8	3012	47 3/4	38	42 5/8	+3	+7.57
Control Data	39 1/4	23 5/8	6613	30 7/8	23 5/8	24 1/4	-4 5/8	-16.02
Electronic Assoc.	27 1/8	12 1/4	487	13 7/8	12 1/4	12 1/2	-1/2	-3.85
General Electric	120	80	2430	94 1/4	83 3/4	93	+7 5/8	+8.93
Honeywell	96	56 1/4	1344	61	56 1/4	60	--	--
IBM	375	289 1/2	1439	326	289 1/2	322	+29 3/8	+10.04
Inter. Tel & Tel	79 3/8	58 1/8	1407	65 5/8	58 1/8	65	+6 1/2	+11.11
Litton	86 1/2	56 5/8	2406	68 1/2	56 5/8	65 1/2	+7 1/2	+12.93
Nat. Cash Register	91 1/2	59	656	61 1/2	59	59 5/8	+1/8	+.21
RCA	62 1/4	36 3/4	4539	44 1/4	36 3/4	43	+6 1/4	+17.01
Raytheon	56 7/8	36	4581	49 1/4	40	44 5/8	+2 3/4	+6.57
SCM	91 7/8	42 1/8	7018	52 5/8	42 1/8	47 1/2	+3 3/8	+7.65
Scientific Data	81 1/8	41 1/4	710	50 3/8	41 3/8	46	+3 3/8	+7.92
Singer	64 3/4	39 3/8	974	42	39 3/8	40 5/8	+1	+2.52
Sperry Rand	33 5/8	17 1/8	12,767	25 1/2	20 5/8	23 3/4	+2 5/8	+12.43
Teledyne	133	50 3/8	2188	66 3/8	51	60 1/8	+7 5/8	+14.52
NYSE COMPUTER STOCK AVERAGE							+4.34	+6.51
AMERICAN STOCK EXCHANGE								
ANelex	28	8	203	9 1/2	8 1/8	8 1/8	-1/8	-1.51
Audio Devices, Inc.	41 1/4	21 7/8	340	28 1/8	23 1/4	25 1/2	+1 1/2	+6.25
Bunker-Ramo	10 1/2	4 5/8	973	5 3/4	4 5/8	5 3/8	+5/8	+13.16
Cal Comp	28 1/4	13 1/4	229	22 3/4	18 1/2	21 3/4	+3 1/4	+17.57
Clary	8	3 5/8	98	4 3/8	3 3/4	4	+3/8	+10.34
Computer Applications	26 1/4	9 1/4	177	11 1/8	9 1/4	9 1/2	-1 7/8	-16.48
Computer Science	37 1/4	15 1/4	529	19 1/2	15 1/4	16 7/8	-1/2	-2.88
*Leasco Data Proc Equip Corp	40 1/2	18 7/8	1231	30 3/4	18 7/8	22 7/8	-2 5/8	-10.29
Levin-Townsend Comp Corp	26 7/8	8 5/8	304	11 7/8	8 5/8	9 1/4	-2 3/4	-22.92
Milgo Electronics	8 7/8	4	206	7 1/2	4	6 1/2	+2 1/2	+62.50
Planning Research	36 1/2	13	77	15 5/8	13	14	+3/8	+2.75
Potter Instrument	26 3/8	10	172	11 1/2	10	10 3/8	-5/8	-5.68
* New listing on this table								
AMEX COMPUTER STOCK AVERAGE							+.01	+4.40

OVER-THE-COUNTER	High Bid	Low Bid	October 21 Bid	October 21 Asked	2 weeks ago Bid
Applied Data Research, Inc.	6 3/4	3	3	3 1/2	3 1/4
Aries Corp.	8 1/2	3	7	7 1/2	7
Automatic Data Processing	50	29 1/2	37 1/2	40 3/4	31 1/2
Bolt, Beranek & Newman, Inc.	16	7 1/2	8 3/4	9 1/8	9
C-E-I-R	15 1/4	5 3/4	6 3/8	6 3/4	5 7/8
Computer Usage	24 1/2	16 3/4	17 3/4	19 5/8	18
Data Products	4	2 3/8	2 1/2	2 7/8	2 1/2
Digital Equipment	26	18	20	20 1/2	18
Digitronics	12 3/4	5 3/8	5 3/8	6 1/8	5 1/2
Documentation, Inc.	8 1/2	3 5/8	3 5/8	4	4 1/8
DPA, Inc.	19 7/8	4 7/8	4 7/8	5 3/8	7
Electronic Memories	26	10 1/4	10 1/4	11	13
Fabri-Tek	26	7 1/8	7 3/4	8 1/4	7 1/8
Informatics, Inc.	8 1/2	7 3/4	8 1/4	9 1/8	8 1/2
Management Assistance	45 3/4	11 1/4	11 1/4	11 3/4	20 3/8
Memorex	64 1/2	31 1/2	48	49 1/2	43
Mohawk Data Sciences	46	19	20 1/2	22 1/4	21 3/4
Randolph Computer Corp.	21 3/4	10 1/2			11
Recognition Equipment, Inc.	72	34	42	45 3/8	37
Systems Engineering Laboratories			5 1/4	5 1/2	4 7/8
University Computing Co.	28 1/2	9 5/8	15 1/2	16	13 1/2

INTERNATIONAL NOTES

France: The Paris center of the ITT Data Network is reported to be unhappy with its IBM 360/40. Reasons given are lack of reliability and unsuitable software for service bureau work. The center would like to replace it with a Univac machine, but ITT ties with IBM are likely to result in their having twin 360/40 installations.

Britain: Attempted sales of the GE 600 in the UK are reported to have been stopped. This machine was under evaluation for use in some British universities, and was reportedly the favored machine by at least one university. Market withdrawal is believed due to GE's hesitancy to assume the support costs for isolated 600 installations.

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E|D|P
INDUSTRY AND
MARKET REPORT

A SEMI-MONTHLY NEWSLETTER FOR EXECUTIVES
IN THE ELECTRONIC DATA PROCESSING INDUSTRY,
AND THE FINANCIAL COMMUNITY.

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Telephone 617/332-8840

UPCOMING INQUIRY BY FCC WILL TAKE A HARD LOOK AT GROWING COOPERATION/COMPETITION BETWEEN COMPUTER AND COMMUNICATIONS COMPANIES

A sweeping inquiry into the interrelationships between computers and communications is about to be launched by the Federal Communications Commission. It will be, perhaps, the broadest such inquiry the FCC has ever held. Among the topics in the Pandora's box that is being opened: a review of all regulations that currently affect data communications; a determination whether the FCC - or some new agency - should have regulatory authority over information processing and services; an appraisal of possible interconnections between private setups and common carrier facilities. The results of the inquiry could have major effects on companies in both the computer and the communications industry. Also, the outcome could have a major bearing on all the companies presently pioneering in the "information utility" business.

The competitive overtones are played down by the principal participants, but they are quite clear. At present, IBM and AT&T take a quiet and noncommital attitude; but the inquiry could evolve into a major battle between IBM and AT&T. Both have high-level task forces at work to figure out what the company positions will be. Interested parties hope the inquiry will be an opportunity for open discussion on a series of very complex issues, but they fear entrenchments that will only harm progress in a rapidly developing and evolving field.

Why the inquiry?

Several special cases have laid the groundwork for this inquiry:

• Bunker-Ramo Corp., in establishing Telequote IV, proposed not only to supply information on securities but also to forward messages. Thus, a broker using the service could transact stock sales and purchases. The common carriers didn't want to provide communications circuits on the grounds that Bunker-Ramo would be reselling them. The carriers finally consented to provide service after Bunker-Ramo convinced them it qualified to act as a communications broker. Control over this type activity, however, still apparently rests with the carrier rather than with a regulatory agency.

• Western Union, which is trying to buy the TWX network from AT&T and thereby control the record communication service in this country, was criticized by the FCC for not filing a tariff on the computer services it offered customers. The company has solved the problem, for the present, by separating charges for data transmission from those for computation. This type situation, however, could make life harder for outside users in the future, as transmission gets harder and harder to segregate from other services.

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These specific cases - along with a few others - merely illustrate the fact that more and more businesses are operating in areas that might come under jurisdiction of the FCC. The inquiry, therefore, should be an excellent opportunity for interested parties to speak out without bringing a specific case before the commission, an action that many companies are prone to shy away from.

The notice of the inquiry is quite thorough in its review of "the convergence and growing interdependence of the computer and communications." It starts with a description of four types of "emerging computer enterprises" that rely on time-sharing and/or multiple-access computers and that therefore imply substantial use of communications channels:

1. In-house computer systems - at banks, aircraft companies, and universities, for example - already have or soon will have more than enough capacity for the prime user. This extra capacity is easily saleable via time-sharing terminals.

2. Service bureaus operated by major computer manufacturers are rapidly converting to time-sharing and establishing data banks that can be used by many customers for such tasks as economic forecasting and marketing analysis.

3. There are hundreds of non-manufacturing firms that offer information services. Many are local in scope, but others are equipped with multiple access computers and are trying to develop widespread time-sharing systems.

4. The growing list of highly specialized computer services combine data processing and communications. Among these are stock quotation services, hospital information services, coordinated law enforcement services, and various kinds of reservation services.

In addition, there are many computers that can be programmed for message and circuit switching as well as data processing. Thus, data processing and message switching can be effectively combined with communication channels to form a real-time processing and communications system. Indeed, many of today's time-sharing services are doing just this to cut down communication costs for their users.

On the other hand, the notice continues, the common carriers are rapidly becoming equipped to enter the data processing field. Central offices are being converted from electro-mechanical to electronic switching systems. The computers that do switching can also be programmed to perform data processing functions. Thus, the carriers are moving into position to operate information utilities. Western Union, in fact, has announced that it is going into this business and has already made several moves in this direction: It is operating data processing centers in key cities; it provides private communications systems for business customers; it has announced special services such as one for matching job hunters with potential employers. As soon as most of its communications network is switched by computer, it will be able to offer even more generalized services.

The Bell System, by contrast, has yet to indicate that it plans similar services; it doesn't even offer local data processing services to the public. But it does have a large stake in information utilities. In addition to supplying communication links for most services, it builds the Teletype and the Touch-Tone telephone, both of which are used as remote terminals. Indeed, adaptations of the Touch-Tone instrument could be the basis for remote home or office terminals in the near future.

International common carriers are also getting into the act. ITT offers a message switching service to airlines; it plans to use the same computer that does the switching to store and supply up-to-the-minute seat inventory information. Other carriers, the notice says, plan to introduce similar service offerings.

The problems involved

The remainder of the inquiry notice discusses current and projected problems that seem to face computer or communication companies, then lists specific points upon which it invites response from interested parties. These break down, roughly, into four broad categories:

1) the basis for charges and the possible need for regulation in message switching, data processing, general or special information services, or any combination of these;

2) whether tariffs should allow the interconnection of private and common carrier facilities, with rate structures not based on time and distance, but perhaps on the quantity of information transmitted; and whether there should be shared use of equipment and services offered by common carriers, or restrictions on use of such services, including prohibitions against resale;

3) whether the service and practices of common carriers are keeping pace with the quickened developments in digital technology and whether there is a gap between computer industry needs and communications technology and practice;

4) how both the computer industry and the common carriers can protect the privacy and proprietary nature of data stored in computers and transmitted over communication facilities.

We have talked to the major parties that will be affected by the inquiry. Here is the current thinking - and opposing views - on each side of the ledger.

Regulation of services. There is general agreement on the first category. Communication companies think that regulation should extend to all organizations offering the same services, or to none. The attitude of computer companies is probably best summed up by IBM's statement that there is a difference between data transmission and data transformation, and that only data transmission should be subject to regulation. If a communications company wants to get into information services, the computer people argue, let them separate the charges for the two phases of the service so that a reduced rate for the transmission portion of the service won't subsidize the data portion of the over-all service. Assuming something along these lines is agreed upon, and all services except actual data transmission remain competitive as at present, the only problem seems to be that of message switching. The solution probably will be that message switching, by itself, will be subject to regulation; when, however, it is performed in conjunction with some other information service, it will be considered part of a total package priced at what the market will bear. This resolution would allow common carriers to get into the information service business. With AT&T thus a potential competitor, the computer companies might hold out for a more rigid restraint on common carriers.

Interconnection of services. The second category - which concerns itself with the interconnection between private and common carrier facilities - probably is the most discussed among computer people, especially those who are connected

with time sharing. It is also a subject on which the major carriers have a firm position. For one thing, a liberal policy under this category could well stimulate future competition, and no firm wants to encourage an erosion of its share of a profitable market.

• Rate structures have been a bone of contention among some large users of computers and communications. One of the industry's outstanding spokesmen says: "We are time sharing computers but they (the carriers) aren't time-sharing communications. They must change their method of switching, which is appropriate to the days of telegraphy." AT&T, on the other hand, claims it uses the most efficient possible switching network, when peak loads are considered. In any event, large users would like to pay only for actual transmission time used, with lines perhaps being shared by many users. This is possible with a private network, but these can't feed into the public networks at the terminal end. Thus even large private communications systems, practical with satellites, would still not be able to serve users unless there were private lines to the distribution point. This point will certainly lead to a spirited discussion between the two factions involved.

• The terminal itself is another area of conflict. This is potentially as large a market as that for central processors, or larger. Yet, under existing regulations, AT&T must supply the Modems (modulation-demodulation equipment) for any terminals connected to its public communications network. Other companies can and do make similar equipment for private networks, but AT&T says with some justification that it needs to own this equipment so that it can make changes within the system. "We can't let a terminal control the evolution of the communications system," a spokesman says. However, AT&T may have to concede some of this business to responsible manufacturers.

• The matter of technology also brings outspoken reaction from computer users but equally firm comment from AT&T. The telephone people claim that we're just experiencing another growth situation and that its service will keep pace with improvements in technology. Sophisticated computer users claim, however, that what is developing is revolutionary, not evolutionary, and that a new approach is necessary to prevent the voice network from being swamped. Spokesmen hope that the inquiry will provide the legal framework that's needed to encourage the common carriers to aggressively explore new technologies. They must be provided with an atmosphere, says one authority, to sit back, decide what services should be offered, then work out a way of providing these. There certainly are advanced data transmission techniques to be experimented with on a commercial basis, and people who question the technological proficiency of the communications industry hope that, as a result of the inquiry, an atmosphere can be developed to encourage experimentation.

• Everyone agrees that privacy is essential to developing vast information systems for a country such as the U.S. Common carriers have always lived with secrecy of communications, and claim there are no unsolvable problems as we go to more and more data transmission and computation over communications lines. And they, the equipment manufacturers, and computer users agree that the hardware to guarantee this is here. But it boils down to a matter of public policy as to who decides what information searches are legal and how to certify that privacy is protected. Thus the inquiry could go a long way toward clarifying this situation. Control of privacy may well require another government agency, or expanded powers for the FCC, but this step may well be necessary so that the public is protected from misuse of vast collections of personal or proprietary data banks.

Conclusions

The information utility, we feel, should be given a chance to succeed as a business venture. It should be charged, therefore, communications costs based only on the quantity of its commodity it sends over the wires. This business has few of the characteristics of other utilities and, indeed, perhaps is misnamed. At present, and for the foreseeable future, ingenuity and programming skill are far more important to success in this field than is the ownership of vast plant and equipment. Communication channels are necessary, and should be provided by the carriers authorized by law to build facilities that cross private and public property. These services should be maintained and improved to handle the increasing loads that development of information services will bring. They should also be fairly priced to whomever wants to use them.

Provision should be made for interfacing private networks with those of the common carrier, and some standards should be devised so that responsible manufacturers can provide equipment that can be attached to the communication circuits, in the same manner that many companies make electric appliances that will operate on the power provided by electric utilities. We see no reason why the carriers should be prevented from starting computer utilities, but there should be very stringent regulations that require them to separate transmission costs from other expenses and not to subsidize information services with income from voice or data transmission charges. This, especially in the case of AT&T, would probably require the establishment of a separate company that paid for its transmission costs the same as any other company.

New regulations will be necessary to insure that competition is maintained, and this requires an enlightened attitude on the part of the regulatory agency. Also, protection of privacy is essential to the growth of information services, and should be well examined and regulated as a matter of public policy.

This inquiry - which could well be the broadest ever conducted by the FCC - could move all parties involved much closer to a workable arrangement for the future. It also could set the pace for developments over the next several years in both the communications and data processing industries. All parties involved, naturally, will try to protect their own position and future. But a friendly intercourse that exposes potential problems and educates all participants could lead to regulations that insure everyone a fair chance in the competitive marketplace. Also, it should lead to balanced communications-computer interaction as more people take advantage of convenient services assisted by the computer.

James Peacock, Associate Editor

GENERAL ELECTRIC AND DARTMOUTH TEAM UP IN LARGE-SCALE PROGRAM TO DEVELOP AND USE TIME SHARING ON THE GE 625

A General Electric 625 computer, recently installed at Dartmouth College (Hanover, N.H.), will soon provide a large-scale time-sharing service that reflects the closest interaction yet between a university and a computer manufacturer. In essence, GE gives Dartmouth the computer and in return the school's computer personnel and undergraduate students write an executive routine and a conversational language for the machine.

During the next three years, GE and Dartmouth will split the use of 200 terminals attached to the 625. After that, the machine becomes Dartmouth property. In the interim, Dartmouth will connect to the machine through two Datanet 30's

(Continued on page 8)

MONTHLY COMPUTER CENSUS

The number of electronic digital computers installed or in production at any one time has been increasing at a bewildering pace in the past several years. New vendors have come into the market, and familiar machines have gone out of production. Some machines have been received with open arms by users -- others have been given the cold shoulder.

To aid readers of the EDP I&MR in keeping with this mushrooming activity, we compile and publish this monthly report on the number of general purpose electronic computers made by American-based companies which are installed or on order as of the preceding month. These figures included installations and orders outside the United States. We update this computer census monthly, so that it will serve as a "box score" of progress in following the growth of the American computer industry, and of the computing power it builds.

In general, manufacturers in the computer field do not officially release installation and on order figures. The figures in this table are developed through a continuing market survey conducted by our research staff. This market research program develops a documented data file on over 80% of the computer installations in the United States. A similar program is conducted for overseas installations.

Comments on this census from informed readers will be welcomed.

AS OF OCTOBER 10, 1966

NAME OF MANUFACTURER	NAME OF COMPUTER	SOLID STATE?	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS	NUMBER OF UNFILLED ORDERS
ASI Computer	ASI 210	Y	$3850	4/62	25	0
	ASI 2100	Y	$4200	12/63	7	0
	ADVANCE 6020	Y	$4400	4/65	12	4
	ADVANCE 6040	Y	$5600	7/65	6	5
	ADVANCE 6050	Y	$9000	2/66	4	6
	ADVANCE 6070	Y	$15,000	10/65	5	6
	ADVANCE 6130	Y	$1000	11/66	0	7
Autonetics	RECOMP II	Y	$2495	11/58	38	X
	RECOMP III	Y	$1495	6/61	8	X
Bunker-Ramo Corp.	BR-130	Y	$2000	10/61	160	2
	BR-133	Y	$2400	5/64	24	45
	BR-230	Y	$2680	8/63	15	X
	BR-300	Y	$3000	3/59	36	X
	BR-330	Y	$4000	12/60	32	X
	BR-340	Y	$7000	12/63	20	X
Burroughs	205	N	$4600	1/54	44	X
	220	N	$14,000	10/58	35	X
	E101-103	N	$875	1/56	130	X
	B100	Y	$2800	8/64	158	17
	B250	Y	$4200	11/61	85	1
	B260	Y	$3750	11/62	230	5
	B270	Y	$7000	7/62	162	6
	B280	Y	$6500	7/62	129	8
	B300	Y	$10,000	7/65	110	88
	B2500	Y	$5000	1/67	0	36
	B3500	Y	$14,000	5/67	0	24
	B5500	Y	$22,000	3/63	58	14
	B6500	Y	$33,000	2/68	0	7
	B8500	Y	$200,000	2/67	0	1
Control Data Corporation	G-15	N	$1600	7/55	310	X
	G-20	Y	$15,500	4/61	23	X
	LGP-21	Y	$725	12/62	118	X
	LGP-30	semi	$1300	9/56	122	X
	RPC-4000	Y	$1875	1/61	55	X
	160*/160A/160G	Y	$2100/$4000/$12,000	5/60;7/61;3/64	456	7
	924/924A	Y	$11,000	8/61	26	X
	1604/1604A	Y	$45,000	1/60	59	X
	1700	Y	$4000	5/66	18	105
	3100	Y	$11,000	12/64	95	35
	3200	Y	$14,000	5/64	88	X
	3300	Y	$15,000	9/65	55	45
	3400	Y	$25,000	11/64	19	X
	3500	Y	$30,000	9/67	0	9
	3600	Y	$58,000	6/63	50	X
	3800	Y	$60,000	2/66	8	15
	6400	Y	$50,000	5/66	7	17
	6600	Y	$85,000	8/64	19	15
	6800	Y	$130,000	4/67	0	4
Data Machines, Inc.	620	Y	$900	11/65	22	30
Digital Equipment Corp.	PDP-1	Y	$3400	11/60	60	X
	PDP-4	Y	$1700	8/62	57	X
	PDP-5	Y	$900	9/63	115	X
	PDP-6	Y	$10,000	10/64	22	3
	PDP-7	Y	$1300	11/64	88	48
	PDP-8	Y	$525	4/65	450	280
	PDP-9	Y	$1000	12/66	0	35
El-tronics, Inc.	ALWAC IIIE	N	$1820	2/54	17	X
Electronic Associates, Inc.	8400	Y	$12,000	6/65	9	9
Friden	6010	Y	$600	6/63	450	80
General Electric	115	Y	$1800	12/65	160	575
	205	Y	$2900	6/64	44	X
	210	Y	$16,000	7/59	50	X
	215	Y	$6000	9/63	54	X
	225	Y	$8000	4/61	205	X
	235	Y	$10,900	4/64	67	3
	415	Y	$9600	5/64	185	65
	425	Y	$18,000	6/64	75	45
	435	Y	$25,000	9/65	29	18
	625/635	Y	$55,800	5/65	35	33
	645	Y	$90,000	7/66	2	10
Honeywell	DDP-24	Y	$2500	5/63	80	5
	DDP-116	Y	$900	4/65	115	45
	DDP-124	Y	$2050	3/66	15	45
	DDP-224	Y	$3300	3/65	38	10
	H-120	Y	$3800	1/66	240	270
	H-200	Y	$7500	3/64	885	135
	H-400	Y	$8500	12/61	117	X
	H-800	Y	$26,000	12/60	89	3
	H-1200	Y	$7300	2/66	22	72
	H-1400	Y	$14,000	1/64	12	1

NAME OF MANUFACTURER	NAME OF COMPUTER	SOLID STATE?	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS	NUMBER OF UNFILLED ORDERS
Honeywell (cont'd)	H-1800	Y	$35,000	1/64	17	2
	H-2200	Y	$13,000	1/66	14	52
	H-4200	Y	$20,500	3/67	0	6
	H-8200	Y	$35,000	3/68	0	2
	DATAmatic 1000	N	$40,000	12/57	2	X
IBM	305	N	$3600	12/57	146	X
	360/20	Y	$2000	12/65	725	6300
	360/30	Y	$7500	5/65	1950	4550
	360/40	Y	$15,000	4/65	1000	1550
	360/44	Y	$10,000	7/66	10	125
	360/50	Y	$26,000	8/65	120	550
	360/62	Y	$55,000	11/65	1	X
	360/65	Y	$50,000	11/65	20	205
	360/67	Y	$75,000	10/66	0	60
	360/75	Y	$78,000	2/66	10	30
	360/90 Series	Y	$140,000	6/67	0	9
	650	N	$4800	11/54	175	X
	1130	Y	$1200	11/65	400	3800
	1401	Y	$6600	9/60	7700	250
	1401-G	Y	$2300	5/64	1580	50
	1410	Y	$14,200	11/61	800	75
	1440	Y	$4800	4/63	3200	200
	1460	Y	$11,500	10/63	1750	75
	1620 I, II	Y	$4000	9/60	1680	20
	1800	Y	$7600	1/66	45	275
	701	N	$5000	4/53	1	X
	7010	Y	$22,600	10/63	210	6
	702	N	$6900	2/55	6	X
	7030	Y	$160,000	5/61	6	X
	704	N	$32,000	12/55	32	X
	7040	Y	$22,000	6/63	120	4
	7044	Y	$32,000	6/63	121	5
	705	N	$38,000	11/55	52	X
	7070, 2, 4	Y	$27,000	3/60	328	X
	7080	Y	$55,000	8/61	85	X
	709	N	$40,000	8/58	9	X
	7090	Y	$63,500	11/59	45	X
	7094	Y	$72,500	9/62	118	2
	7094 II	Y	$78,500	4/64	126	6
Monroe Calculating Machine Co.	Monrobot XI	Y	$700	12/60	480	100
National Cash Register Co.	NCR - 304	Y	$14,000	1/60	26	X
	NCR - 310	Y	$2500	5/61	20	X
	NCR - 315	Y	$8500	5/62	350	100
	NCR - 315-RMC	Y	$12,000	9/65	52	75
	NCR - 390	Y	$1850	5/61	1025	40
	NCR - 500	Y	$1500	10/65	510	830
Philco	1000	Y	$7010	6/63	16	X
	2000-210, 211	Y	$40,000	10/58	16	X
	2000-212	Y	$52,000	1/63	10	X
Radio Corporation of America	RCA 301	Y	$7000	2/61	645	2
	RCA 3301	Y	$17,000	7/64	64	9
	RCA 501	Y	$14,000	6/59	97	X
	RCA 601	Y	$35,000	11/62	5	X
	Spectra 70/15	Y	$4100	9/65	62	105
	Spectra 70/25	Y	$6700	9/65	34	58
	Spectra 70/35	Y	$10,400	7/66	5	85
	Spectra 70/45	Y	$17,400	11/65	15	105
	Spectra 70/55	Y	$40,500	11/66	0	12
Raytheon	250	Y	$1200	12/60	175	X
	440	Y	$3500	3/64	16	3
	520	Y	$3200	10/65	17	8
Scientific Control Corporation	650	Y	$500	5/66	1	8
	655	Y	$1800	10/66	0	2
	660	Y	$2000	10/65	5	3
	670	Y	$2600	5/66	1	2
Scientific Data Systems Inc.	SDS-92	Y	$1500	4/65	64	30
	SDS-910	Y	$2000	8/62	182	6
	SDS-920	Y	$2900	9/62	133	12
	SDS-925	Y	$3000	12/64	27	10
	SDS-930	Y	$3400	6/64	125	20
	SDS-940	Y	$10,000	4/66	5	12
	SDS-9300	Y	$7000	11/64	28	8
	Sigma 2	Y	$1000	1/67	0	50
	Sigma 7	Y	$12,000	12/66	0	24
Systems Engineering Labs	SEL-810/810A	Y	$1000	9/65	24	8
	SEL-840/840A	Y	$1400	11/65	4	4
UNIVAC	I & II	N	$25,000	3/51 & 11/57	26	X
	III	Y	$20,000	8/62	77	X
	File Computers	N	$15,000	8/56	16	X
	Solid-State 80 I, II, 90 I, II & Step	Y	$8000	8/58	260	X
	418	Y	$11,000	6/63	90	40
	490 Series	Y	$35,000	12/61	108	55
	1004	Y	$1900	2/63	3200	50
	1005	Y	$2400	4/66	375	300
	1050	Y	$8000	9/63	290	45
	1100-1106 Series	N	$35,000	12/50	11	X
	1107	Y	$55,000	10/62	29	X
	1108	Y	$65,000	9/65	22	50
	9200	Y	$1500	6/67	0	500
	9300	Y	$3400	6/67	0	125
	LARC	Y	$135,000	5/60	2	X
				TOTALS	38,218	23,909

X = no longer in production.

* To avoid double counting, note that the Control Data 160 serves as the central processor of the NCR 310. Also, many of the orders for the IBM 7044, 7074, and 7094 I and II's are not for new machines but for conversion from existing 7040, 7070, and 7090 computers respectively.

STOCK MARKET REPORT ON SELECTED EDP FIRMS

October 21, 1966 - November 11, 1966

	1966 High	1966 Low	3 weeks Sales in 100's	3 weeks High	3 weeks Low	Last	3 weeks Net Change	3 weeks % Change
NEW YORK STOCK EXCHANGE								
Addressograph-Multigraph	77 3/8	51 1/2	975	60	54	55 1/8	-2 7/8	-4.96
American R & D	44 3/4	20 1/4	500	38 3/4	30 1/8	38 1/8	+7	+22.49
Ampex Corporation	27 5/8	17	2585	21 3/8	17 1/2	21	+2 1/4	+12.00
Burroughs	88 1/2	49 1/4	4119	74 7/8	61 5/8	73 1/4	+7 1/2	+11.41
Collins Radio	85 3/8	37 5/8	2771	50 1/2	39 1/8	50	+7 3/8	+17.30
Control Data	39 1/4	23 5/8	4350	30 3/4	24 5/8	30	+5 3/4	+23.71
Electronic Assoc.	27 1/8	12 1/4	817	16 7/8	12 1/2	16 1/2	+4	+32.00
General Electric	120	80	2581	98 1/2	92 7/8	98 1/4	+5 1/4	+5.64
Honeywell	96	55 1/8	1778	60	55 1/8	57 7/8	-2 1/8	-3.67
IBM	375	289 1/2	1626	354 1/2	318 3/8	352	+30	+8.52
Inter. Tel & Tel	79 3/8	58 1/8	970	70 3/8	64 1/4	70 1/4	+5 1/4	+8.08
Litton	86 1/2	56 5/8	2110	72 3/4	65	70 3/4	+5 1/4	+7.95
Nat Cash Register	91 1/2	59	971	67	59	67	+7 3/8	+12.37
RCA	62 1/4	36 3/4	4656	49 1/4	43 1/4	48 1/4	+5 1/4	+9.88
Raytheon	56 7/8	36	3057	50 5/8	43 1/4	48 7/8	+4 1/4	+9.52
Scientific Data	81 1/8	41 1/4	1546	52 3/8	42 1/4	51 1/2	+5 1/2	+11.96
SCM	91 7/8	42 1/8	6191	57 3/4	45 1/2	57 1/8	+9 5/8	+20.26
Singer	64 3/4	39 3/8	1391	46 1/4	40 1/8	44 3/8	+3 3/4	+9.23
Sperry Rand	33 5/8	17 1/8	10,165	27 1/4	22 5/8	26 7/8	+3 1/8	+13.16
Teledyne	133	50 3/8	2110	73 5/8	58 1/8	73 5/8	+13 1/2	+22.45
NYSE COMPUTER STOCK AVERAGE							+6.63	+12.46
AMERICAN STOCK EXCHANGE								
ANelex	28	7 3/8	306	9	7 3/8	7 3/4	-3/8	-4.62
Audio Devices, Inc.	41 1/4	17	1423	25 3/4	17	18	-7 1/2	-29.41
Bunker-Ramo	10 1/2	4 5/8	855	6 1/4	5 1/8	6 1/8	+3/4	+13.95
Cal Comp	28 1/4	13 1/4	311	25 1/4	21 1/4	24 7/8	+1 1/8	+5.13
Clary	8	3 5/8	96	4 3/8	3 7/8	4 3/8	+3/8	+9.38
Computer Application	26 1/4	8	737	10 1/2	8	10 3/8	+7/8	+9.20
Computer Science	37 1/4	15 1/4	910	19 1/8	15 1/4	18 1/4	+1 1/2	+8.89
Leasco Data Proc Equip Corp	40 1/2	18 1/2	950	25 1/2	18 1/2	25 1/2	+2 5/8	+11.26
Levin-Townsend Comp Corp	26 7/8	8 5/8	218	10	8 5/8	9	-1/4	-2.70
Milgo Electronics	8 7/8	4	229	7 3/8	5 1/4	7 3/8	+7/8	+13.46
Planning Research	36 1/2	12 7/8	150	16 5/8	12 7/8	16 3/8	+2 5/8	+19.11
Potter Instrument	26 3/8	9 1/8	319	11 3/8	9 1/8	11 1/8	+3/4	+7.23
AMEX COMPUTER STOCK AVERAGE							+0.21	+4.24

	1966 High Bid	1966 Low Bid	November 11 Bid	November 11 Asked	3 weeks ago Bid
OVER-THE-COUNTER					
Applied Data Research, Inc.	6 3/4	2 5/8	2 3/4	3 1/4	3
Aries Corp.	8 1/2	3	8 1/2	9 3/4	7
Automatic Data Processing	*24 1/2	21 3/4	24 1/2	26 1/4	---
Bolt, Beranek & Newman, Inc.	16	7 1/2	8 1/2	9	8 3/4
C-E-I-R	15 1/4	5 3/4	6 1/2	6 7/8	6 3/8
Computer Usage	24 1/2	16 3/4	18 3/4	20 5/8	17 3/4
Data Products	4	2 3/8	2 3/8	2 3/4	2 1/2
Digital Equipment	26	18	26	28	20
Digitronics	12 3/4	4 3/4	5 1/8	5 1/2	5 5/8
Documentation, Inc.	8 1/2	3 1/2	3 1/2	3 7/8	3 5/8
DPA, Inc.	19 7/8	4	4 1/8	4 5/8	4 7/8
Electronic Memories	26	10	13 3/4	14 1/4	10 1/4
Fabri-Tek	26	7	7 1/4	7 3/4	7 3/4
Informatics, Inc.	8 1/2	7 3/4	8	8 7/8	8 1/4
Management Assistance	45 3/4	11 1/4	13 7/8	14 1/4	11 1/4
Memorex	64 1/2	31 1/2	55 1/4	56 1/4	48
Mohawk Data Sciences	46	19	22	23 1/2	20 1/2
Randolph Computer Corp	21 3/4	10	11 1/2	13 1/8	11 1/2
Recognition Equipment, Inc.	72	34	39	42 3/4	42
Systems Engineering Labs			5 3/4	6 3/8	5 1/4
University Computing Co.	28 1/2	9 5/8	16 3/4	17 3/8	15 1/2

* stock split

(Continued from page 5)

located in the school's new Kiewit Computation Center that was recently dedicated. Other New England schools will be able to tie into this system. For commercial users, GE will put a Datanet 30 in New York City and Boston. Subscribers will pay only local communications charges, since the 30's will serve as message concentrators and tie into the main computer over high-density communication channels.

The 625 replaces Dartmouth's 265, on which the school's personnel wrote the Basic language two-and-a-half years ago. This simplified language, used by students and faculty via some 40 terminals scattered around the campus, is also offered by GE on its commercial time-shared systems. As soon as the software is written for the 625 at Dartmouth - estimated to be about January 1, 1967 - GE will be able to offer it to users of other 625's.

December 1, 1966 Vol. 2, No. 13

E|D|P
INDUSTRY AND MARKET REPORT

A SEMI-MONTHLY NEWSLETTER FOR EXECUTIVES IN THE ELECTRONIC DATA PROCESSING INDUSTRY, AND THE FINANCIAL COMMUNITY.

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U. S. BANKS NOW HAVE COMPUTERS WORTH NEARLY $840 MILLION INSTALLED; $220 MILLION TO BE SHIPPED NEXT YEAR; IBM, BURROUGHS, NCR, AND GE DOMINATE MARKET

Compare these two statements:

- Fewer than 7% of the nation's banks have computer systems installed; thus market penetration is low.
- Banks have computer systems worth $837 million installed, an impressive 8.7% of the total value of computers installed in the United States; thus banks are a large market factor.

These seemingly contradictory statements are both true. They hold the key to the substantial market opportunity that the computer industry has in the banking field. The figures, and what they mean, come from EDP I&MR's analysis of the 158-page results of a recent banking survey conducted by the American Bankers Association.

There are about 14,000 banks in the United States, and the ABA calculates that 943 have computers installed and that another 2055 banks use off-premise computer services. This, however, is a significant improvement over the situation in late 1963, when the ABA made its first National Automation Survey, as the pie charts in Figure 1 illustrate:

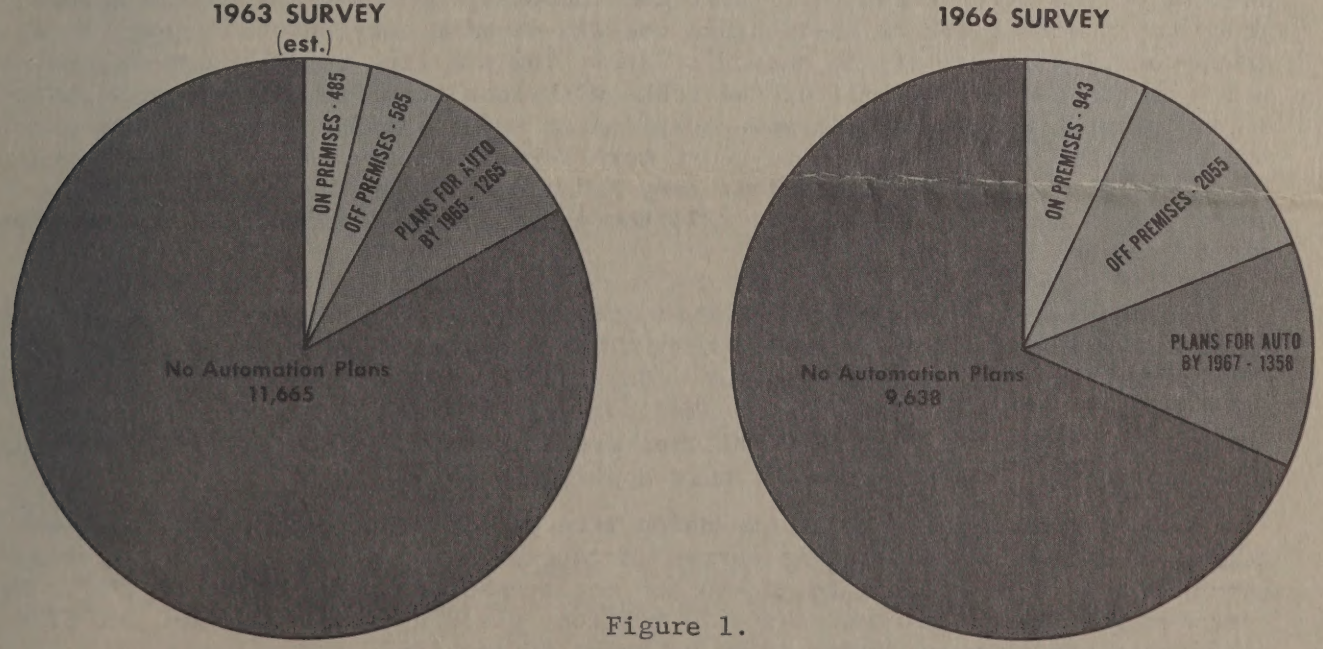

Figure 1.

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But these charts don't tell the whole story. The banks that use computers have roughly 77% of the $303 billion deposited in commercial banks. All banks with deposits of over $500 million are using computers, and for those with deposits of $100 million or more, 91% have their own computer system and another 5% use an off-premise service. Indeed, taken together, these 397 large banks with assets over $100 million have 63% of the nation's total deposits. The breakdown of the outlay for computers is even more striking. As our analysis in Table 1 indicates, only a small percentage of the banks with computers spend the major share of what the banking industry pays for its computer systems.

TABLE 1 - ANALYSIS OF COMPUTERS INSTALLED IN BANKS

Monthly Costs	Banks Using Own Computers (ABA est.)		Value of Computers (EDP I&MR est.)	
	Number	%	$ millions	%
Under $5,000	146	15%	22	3%
$5,000 - $9,999	406	43%	138	16%
$10,000 - $14,999	123	13%	74	9%
$15,000 - $24,999	119	13%	113	14%
$25,000 - $49,999	81	9%	146	17%
$50,000 - $99,999	54	6%	211	25%
$100,000 and over	14	1%	133	16%
TOTALS	943	100%	$ 837	100%

Large banks still best customers

Interestingly enough, it is among this small percentage of banks that the computer industry still has its best potential market. The small banks with under $10 million in deposits number 73% of the total in the country, and those with deposits between $10 million and $50 million make up another 22%. Only a handful of the first group have their own computer, and only 11% of the second group do. Another 15% of these banks use off-premise services. Although this group constitutes 95% of the nation's banks, few are ripe for the computer salesman. In the ABA survey, 75% of the banks with less than $25 million in deposits do no computer processing and have no plans to order a computer or use off-premise services. And, when off-premise users were asked when they planned to buy their own computer, some 70% replied that they had no idea when this cut-over time would come. Indeed, only 12% (or 237) thought they would install their own computer by 1968.

Of course, there is only a handful of first computer accounts still available among larger banks. By next year, only 6% or 46 banks with deposits of over $50 million will not be using a computer. But the potential for upgrading and expanding computer equipment at larger banks is good. Almost 93% of computer-using banks with deposits of over $100 million are interested in converting to on-line/real-time processing for some of their applications.

Our estimates indicate an expansion rate of 18% next year in the value of computer equipment installed at current accounts in the banking field, offering approximately $150 million in add-on and replacement computer sales in 1967. New customer business is estimated at $70 million, yielding a total market for $220 million of computer equipment sales to banks during 1967.

Gains for IBM

IBM, as would be expected, is the largest supplier to the banking industry, but its percentage of number of systems, 58%, is lower than its national average. Only three other companies -- Burroughs, NCR, and General Electric -- have any significant portion of the business (see Table 2).

TABLE 2 — TYPE OF EQUIPMENT BY SIZE OF BANK

	(Deposits in Millions of Dollars)					
Primary manufacturer of computer configuration	Under $10	$10 to $49	$50 to $99	$100 to $499	$500 and over	Total
IBM	57%	58%	54%	64%	59%	58%
Burroughs	13%	17%	26%	12%	4%	16%
NCR	17%	13%	10%	10%	6%	12%
General Electric	8%	8%	8%	12%	21%	10%
Other	5%	4%	2%	2%	10%	4%

Predicting computer vendors' future success among banks is perhaps more difficult than for any market area except the Federal Government. Sales success in this market depends very heavily on peripheral equipment that reads, sorts, and lists checks and other certificates that transfer assets. In particular, an efficient reader/sorter for magnetic ink character recognition (MICR) has been a critical component in computer sales to banks. Now, as we move toward the proposed "checkless society", peripherals that automatically accept and process deposit, transfer, and withdrawal transactions will influence greatly which EDP vendors are successful with sales to banks.

To examine the trends developing in the banking marketplace as third generation computers reach their peak order levels, we spot-checked banks that have Burroughs, GE, IBM, and NCR equipment. IBM and NCR customers, by and large, are staying with their present vendor. In NCR's case, this bears out our previous customer loyalty studies and could indicate that NCR users are waiting for the expected family of new machines (EDP I&MR, Oct. 25, 1966). Another important reason for NCR's keeping its customers is that most of them have low-cost 390 systems, which can be directly upgraded to 500 series equipment. About 36% of the Burroughs and GE customers we checked were adding IBM 360 equipment or moving to larger machines such as the 360/30, 40, 50, and 65. These two companies got a good start in the banking industry with their MICR equipment, but apparently aren't convincing banks to stick with them as equipment needs grow. In our check, we also noted that several banks which are moving to larger IBM equipment also have RCA Spectra 70 equipment on order, perhaps to establish a second vendor relationship for a compatible computer system.

Burroughs, as Table 3 indicates, is strong in the lower-priced equipment fields, while General Electric supplies larger computer configurations. The figures given are total monthly costs, and in many cases include multiple computer systems. As can be seen, IBM supplies almost all the banking customers with large data processing costs. (The 11% "other" figure in the largest category indicates RCA's giant installation at Chase Manhattan Bank.)

What the banks plan

Bank spending, naturally, tends to be proportional to the size of a bank, as Table 4 shows. The computer, however, is rapidly moving into use by smaller

TABLE 3

MONTHLY COMPUTER COSTS BY MANUFACTURER

Monthly Costs	IBM	Burroughs	NCR	GE	Other
Under $5,000	53%	17%	18%	8%	4%
$5,000 - $9,999	58%	24%	9%	6%	3%
$10,000 - $14,999	64%	13%	14%	9%	-
$15,000 - $24,999	64%	6%	10%	16%	4%
$25,000 - $49,999	66%	3%	9%	19%	3%
$50,000 - $99,999	63%	11%	-	18%	8%
$100,000 and over	89%	-	-	-	11%

TABLE 4

MONTHLY COMPUTER COSTS BY SIZE OF BANK

(Deposits in Millions of Dollars)

Monthly Costs	Under $10	$10 to $49	$50 to $99	$100 to $499	$500 and over	Total
Under $5,000	87%	54%	14%	6%	1%	35%
$5,000 - $9,999	9%	38%	68%	23%	1%	34%
$10,000 - $14,999	4%	3%	13%	24%	1%	10%
$15,000 - $24,999	-	1%	3%	30%	13%	9%
$25,000 - $49,999	-	3%	1%	14%	33%	7%
$50,000 - $99,999	-	1%	1%	3%	38%	4%
$100,000 and over	-	-	-	-	13%	1%

and smaller banks. By 1970, the ABA predicts, all banks with deposits of over $100 million will be using computers, as will 98% of those with $50 million and over in deposits. For even smaller banks, the ABA's survey indicates the computer will come into wider use. It predicts that 49% of all banks will be using a computer by 1970 and 55%, or 7665 banks, by 1971. Most of these, as we pointed out earlier, will be using off-premise computer service from a service bureau, a correspondent bank, or a joint venture.

The ABA survey puts a particular spotlight on banks that don't presently use a computer, but that either have a computer on order or plan to contract for off-premise services. Only 25% of these plan to buy their own computer. Of the others, the preference was clearly for correspondent servicing plans, but the ABA noticed that recently there has been a "rash of new announcements on joint ventures, and this program may at last be gaining the kind of banker reaction it deserves."

At present, none of the banks with assets over $500 million are participating in joint ventures. However, 14% of the banks below the $500 million asset size are using joint ventures to supply their computer needs. Of these banks using joint ventures, over 75% pay less than $10,000 a month for computer services, which is about the minimum amount for which a bank can rent and operate its own computer system.

The larger banks, of course, sell computer services to smaller correspondent banks as well as handle jobs for other business firms. Of the banks with deposits of $100 million and above, 19% rent out over one-fourth of their computer time and another 28% rent out between 10% and 25%. This is looked upon by some bankers as a growing source of income. Today, 17% of these banks receive more than 5% of their gross income from computer services. By 1970, however, 25% of these banks expect to take in 5% to 10% of their revenue from computer services, and another 37% expect this income to amount to over 10% of the bank's gross.

The banks are gearing up to actively promote these services, because they find their competition is largely from other banks. Some 26% of the banks in this group have a formal marketing research section to help plan for future services, and another 40% have informal groups. As banks go to on-line processing, the competition will get stiffer. In major cities such as Boston, Chicago, and New York, several competitive systems to handle savings accounts have been started, and this should accelerate as more software is available and new machines are delivered. This will put the banks squarely into the information utility business, and smart bankers already are preparing for this.

At present, demand deposit accounting is the computer's primary use in banks. Of all banks using computers, 93% handle this function, with only 57% handling savings and 46% installment credit. Planned computer applications will bring the percentages for all these functions to over 90%, however, and two-thirds of the banks also plan to handle mortgage loans.

Of the banks which are planning to automate, the ABA reports, 69% planned to convert their first application to the computer within one year from the time the survey was taken, and another 23% during the following year. These banks listed two principal reasons for going to the computer: (1) improve internal systems, and (2) freeze or reduce operating costs. Slightly over half the banks also want to improve management reports, and nearly half want to increase their flexibility by being able to offer additional services.

Banks don't expect to use their current equipment too long. 41% report their present system will be replaced after less than three years of use, and another 35% say the total use of current computers will be between 3 and 5 years. But the next computer banks install (and half have them on order) will see longer use: 38% plan to use them between 3 and 5 years; 56%, over 5 years. The survey results also indicate that the smaller banks will tend to rent computers while the larger ones will purchase them. Only 19% of the smallest size banks plan to use their next computer more than 3 years, while 65% of the largest banks plan to have their next computer more than 5 years. Thus the smaller banks will be good prospects for replacement systems, while larger banks will provide the primary market for add-on memory and peripheral business.

Our projections indicate that the sale of computer equipment to banks should grow at an average compounded rate of 20% during the remaining three years of this decade. Thus, the computer market in banking is growing strongly, and will be for some time. Today's new, small computers make many more banks potential customers, and the development of good application packages for these smaller customers will stimulate this acceptance. The banker, by nature, likes to keep close control on his operation, and a computer system he can afford to install and operate himself will let him move his business away from the service bureau or correspondent bank.

These larger banks, on the other hand, will try to keep the service business, and are quite confident of a bright future for the computer within banking. All banks, regardless of whether they use a computer, were asked to answer a section devoted to banker opinion about future developments. The results, in Table 5 below, "are indicative of bank reaction to the steps leading to the checkless society", the ABA says.

Outlook for the Future

How do you regard this development?	*An accepted fact*			*Just a matter of time*	*At least 10 years away*	*Not likely to happen*	*For giant banks only*
	All banks	*$500 and over*	*Under $10*				
Computerization of major bank applications	56%	99%	34%	25%	8%	4%	7%
Expansion of new computer services	40%	90%	24%	40%	9%	5%	6%
Automated central information files	15%	34%	12%	47%	18%	9%	12%
Use of visual display units for information retrieval and display	11%	36%	10%	38%	22%	15%	14%
Automatic bill payment service for customers	9%	25%	7%	36%	29%	17%	9%
Operations research projects conducted by bank	15%	57%	10%	30%	17%	17%	21%
Bill paying via telephone	2%	6%	2%	26%	38%	26%	8%
Bank credit cards	14%	63%	10%	32%	20%	19%	15%
Elimination of check writing	1%	7%	1%	11%	31%	53%	4%
On-line/real-time processing systems	17%	54%	6%	32%	25%	14%	12%
Satellite computers linked to large-scale time sharing computers	9%	32%	4%	29%	26%	23%	13%
National uniform identification numbers for individuals	5%	4%	5%	36%	35%	22%	2%
Computerization of credit inquiry functions nationwide	2%	....	3%	25%	42%	26%	5%
Use of optical character recognition equipment	8%	28%	5%	35%	32%	16%	9%

The complete ABA survey results, in tabulated form, are available at $20 per copy from Department of Automation, The American Bankers Association, 90 Park Avenue, New York, N.Y. 10016.

MAI HIKES RENTAL RATES AS EXPENSES RISE

Management Assistance, Inc., pinched by high interest rates and rising maintenance costs, has joined the fraternity of firms announcing price increases for data processing equipment. MAI is increasing the rental prices on certain of its punched card machines on lease to customers by 2 1/2% to 12 1/2%. The change is effective December 2nd for new orders, and on March 1, 1967 for equipment already installed or on order. However, MAI notes that existing lease com-

mitments will postpone the effect of the rental increases for many existing customers for periods of one or more years.

MAI has reported gross revenues for the fiscal year ended September 30th of $43.8 million, as compared with $12.9 million for the preceding fiscal year. Net income after taxes was $2,159,927, or 62¢ per share, compared with $846,427, or 33¢ per share, for the preceding year. Earnings of 90¢-$1.00 per share had been predicted by a number of Wall Street sources. However, MAI's last quarter contributed earnings of only $210,000, or 6¢ a share, primarily due to the sharp increase in billings from IBM for maintenance and repair service on MAI-owned data processing equipment and in additional expenses incurred in expanding MAI's own maintenance operations.

MAI - with hundreds of separate data processing units in diverse geographical locations - finds it difficult to anticipate IBM's repair and maintenance charges, since billings are on a time and material basis. The company has been spending about $350,000 a month on IBM maintenance in the first half of the fiscal year. In August they were billed for $567,000. . .the increase explained as a "tightening of the billing operation at IBM." Because of this, the company announced that as of September 30th it has increased substantially its accrual for IBM maintenance and repair charges to cushion such sudden increases in the future.

The hike in interest rates has also caused MAI to take a write-off of some $358,000 of previously deferred costs incurred in training customer engineers, as well as costs of developing offices in certain foreign countries. The expenditures written off had been incurred in connection with the expansion of MAI operations. At the end of the fiscal year it became clear that the additional capital required to support these expansion plans was not available on a reasonable basis.

INTERNATIONAL NOTES

UK computer personnel are finding the job hunting field lucrative, according to a report published by the Graduate Appointment Register. Salary increments of over $700 per year were obtained by 37% of the people switching jobs. . .at a time when there is a national salary freeze. Programmer salaries varied from $2400/year at age 20 to an upper limit of $7000/year regardless of age (about 40-50% of U.S. rates). Systems Analyst salaries varied from $2800/year at 20 years up to $10,000/year (about 50-60% of U.S. rates). The survey also revealed that by the end of their fourth year of employment 55% of new personnel in the computer field will have changed jobs at least once.

England's first computer utility service is to be installed by C-E-I-R at its London center. An IBM 360/67 with a capacity of up to 400 remote terminals is planned. Basic rental cost for a terminal will be $700 per month.

An unusual happening on the UK computer scene is the arrival of a newcomer. Computer Technology Ltd., of Luton, has announced plans to manufacture a machine to its own design. Known as Modular One, it has a memory capacity extensible from 4K to 56K with a .25 usec access time. A standard interface with a parallel transfer rate of 25 million bits per second has been developed to go with the machine. The company has been formed by a breakaway group from Elliott Automation, and compares itself to the U.S. enterprises such as CDC, DEC and SDS. Finance for the new company is being provided by British publisher Robert Maxwell of Pergamon Press, and by a capital venture company, European Enterprises Developments Ltd., owned by a number of European Merchant banks.

IBM has won a major university installation in London, to supply a 360/65H to University College. They also plan to update the 7090 system given to Imperial College under their national center scheme to a 7094II next August.

STOCK MARKET REPORT ON SELECTED EDP FIRMS

November 11 - 25, 1966

	1966 High	1966 Low	2 weeks Sales in 100's	2 weeks High	2 weeks Low	Last	2 weeks Net Change	2 weeks % Change
NEW YORK STOCK EXCHANGE								
Addressograph-Multigraph	77 3/8	50 1/2	1808	55 5/8	50 1/2	52 3/8	-3/4	-1.36
American R & D	44 3/4	20 1/4	430	39 3/4	36	39 1/4	+1 1/8	+2.95
Ampex Corp.	27 5/8	17	2716	24	20 1/2	24	+3	+14.29
Burroughs	88 1/2	49 1/4	3330	82 5/8	72 1/8	82 1/4	+9	+12.29
Collins Radio	85 3/8	37 5/8	4594	60 1/2	48 1/4	60 1/8	+10 1/8	+20.25
Control Data	39 1/4	23 5/8	2465	32 3/4	28 5/8	31 3/8	+1 3/8	+4.58
Electronic Assoc.	27 1/8	12 1/4	558	17 7/8	15 3/4	16 1/4	-1/4	-1.51
General Electric	120	80	1728	98 3/8	95 1/2	97 1/4	-1	-1.02
Honeywell	96	53 1/2	1297	58 1/4	53 1/2	54 7/8	-2 5/8	-4.54
IBM	375	289 1/2	994	366 1/2	345	366 1/4	+14 1/4	+4.05
Inter. Tel & Tel	79 3/8	58 1/8	650	73 7/8	69 1/2	73 7/8	+3 5/8	+5.16
Litton	86 1/2	56 5/8	1603	77 3/4	70 1/4	77 3/4	+7	+9.89
Nat Cash Register	91 1/2	59	1161	67 3/4	62	63	-4	-5.97
RCA	62 1/4	36 3/4	3406	48 1/8	43	43 7/8	-4 3/8	-9.07
Raytheon	56 7/8	36	2408	52 1/2	47 1/4	51 3/4	+2 7/8	+5.88
Scientific Data	81 1/8	41 1/4	1037	58 3/8	50 1/4	58 1/8	+6 5/8	+12.86
SCM	91 7/8	42 1/8	3242	59 3/8	52 1/8	58 5/8	+1 1/2	+2.63
Singer	64 3/4	39 3/8	736	44 3/4	40 7/8	41 1/4	-2 1/2	-5.63
Sperry Rand	33 5/8	17 1/8	6509	27 7/8	25 3/8	27 1/8	+1/4	+0.93
Teledyne	133	50 3/8	2446	81	70	78 1/4	+4 5/8	+6.28
NYSE COMPUTER STOCK AVERAGE							+2.49	+3.64
AMERICAN STOCK EXCHANGE								
ANelex	28	7 3/8	242	8 7/8	7 3/4	8 1/2	+3/4	+9.68
Audio Devices, Inc.	41 1/4	17	568	21 1/2	18 3/8	20 1/2	+2 1/2	+13.89
Bunker-Ramo	10 1/2	4 5/8	942	6 3/4	6	6 1/4	+1/8	+2.04
Cal Comp	28 1/4	13 1/4	218	25 5/8	24 1/8	25 3/8	+1/2	+2.01
Clary	8	3 5/8	56	4 1/4	3 7/8	3 7/8	-1/2	-11.43
Computer Application	26 1/4	8	153	10 5/8	9 1/8	9 1/2	-7/8	-8.43
Computer Science	37 1/4	15 1/4	708	22	18	21	+2 3/4	+15.07
*Digital Equipment	33 3/4	27 1/4	1503	33 3/4	27 1/4	33 1/2	+2 3/8	+7.60
Leasco Data Proc Equip Corp	40 1/2	18 1/2	309	26 3/4	22 1/4	25 7/8	+3/8	+1.47
Levin-Townsend Comp Corp	26 7/8	8 1/2	152	10 1/8	8 1/2	9	--	0.00
Milgo Electronics	8 7/8	4	69	7 1/8	6 1/4	6 1/4	-1 1/8	-15.25
Planning Research	36 1/2	12 7/8	73	16 7/8	15 1/8	16 1/4	+1/8	-0.76
Potter Instrument	26 3/8	9 1/8	392	13 1/4	10 5/8	12	+7/8	+7.87
* new listing on this table								
AMEX COMPUTER STOCK AVERAGE							+4.82	+2.11

	1966 High Bid	1966 Low Bid	November 25 Bid	November 25 Asked	2 weeks ago Bid
OVER-THE-COUNTER					
Applied Data Research, Inc.	6 3/4	2 1/4	2 1/4	2 3/4	2 3/4
Aries Corp.	8 1/2	3	8 1/4	8 3/4	8 1/2
Automatic Data Processing	28 1/2	21 3/4	26	27	24 1/2
Bolt, Beranek & Newman, Inc.	16	7 1/2	7 7/8	8 3/8	8 1/2
C-E-I-R	15 1/4	5 3/4	5 7/8	6 1/4	6 1/2
Computer Usage	24 1/2	16 3/4	19 1/2	20 1/2	18 3/4
Data Products	4	2 1/4	2 1/4	2 1/2	2 3/8
Digitronics	12 3/4	4 3/4	5 3/4	6 1/4	5 1/8
Documentation, Inc.	8 1/2	3 3/8	3 3/8	3 5/8	3 1/2
DPA, Inc.	19 7/8	3 5/8	5 1/4	5 3/4	4 1/8
Electronic Memories	26	10	12 1/2	13	13 3/4
Fabri-Tek	26	6	6 1/8	6 5/8	7 1/4
Informatics, Inc.	8 1/2	7 5/8	7 5/8	8 1/8	8
Management Assistance	45 3/4	11 1/4	14 1/4	12 3/4	13 7/8
Memorex	64 1/2	31 1/2	59 3/4	60 3/4	55 1/4
Mohawk Data Sciences	46	19	23	23 3/8	22
Randolph Computer Corp	21 3/4	10	10 3/4	11 3/4	11 1/2
Recognition Equipment, Inc.	72	33 1/2	33 1/2	35 1/2	39
Systems Engineering Labs			5 7/8	6 3/8	5 3/4
University Computing Co.	28 1/2	9 5/8	17 1/4	18	16 3/4

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E|D|P
INDUSTRY AND MARKET REPORT

A SEMI-MONTHLY NEWSLETTER FOR EXECUTIVES IN THE ELECTRONIC DATA PROCESSING INDUSTRY, AND THE FINANCIAL COMMUNITY.

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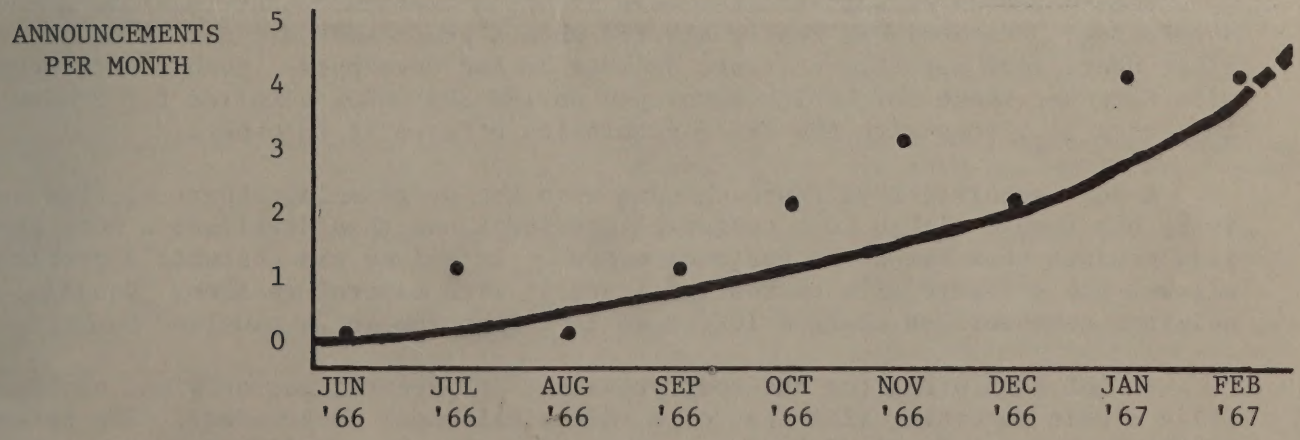
GROWING NUMBER OF INDEPENDENT FIRMS OFFER SOFTWARE-FOR-SALE PACKAGES IN HOPES OF MULTIPLE SALES AND ATTRACTIVE PROFITS ON SINGLE COST PRODUCT

That long-awaited phenomena -- packaged, off-the-shelf software -- is finally emerging as a commercial reality in the computer marketplace. During the last six months, as Figure 1 indicates, the number of software packages offered to the computer user has been growing rapidly. Although the amount of this software-for-sale is not large, the very fact that this product is being marketed in the computer industry is significant. Until recently, independent software selling existed mostly in the daydreams of avaricious programmers.

These specialized software offerings, with one exception, do not come from computer manufacturers, themselves busy perfecting basic operating systems for their new families of machines. (SDS has announced a COBOL package, developed by an independent company, which it will sell or lease to users of its Sigma series.) Rather, a growing number of consultants, software specialty houses, and large think factories have developed packages of software-for-sale and are busily touting their wares before the computer user through advertisements in the technical press and at booths in trade shows.

The types of packages vary almost as much as the groups putting them up for sale: Most fulfill a special need too small or too bothersome to be handled by the computer manufacturer; these programs, therefore, arise out of a specific need

FIGURE 1
RECENT INCREASE IN ANNOUNCEMENTS OF SOFTWARE-FOR-SALE PRODUCTS



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and fit no obvious pattern. The only apparent trend -- and it most likely is a temporary one -- is toward translators that bridge the gap between second generation and newer computers similar to the "Liberator" program Honeywell developed to translate 1401 software for its H200. A number of firms, independently, have developed software packages that allow programs written for older computers to operate on the growing number of IBM 360's. These, perhaps, could cut the use of emulators by allowing users to get more performance out of their 360 equipment at lower cost.

The pattern of pricing for independent software is as diverse as the product. When packages are sold outright, they usually cost between $10,000 and $20,000; when they are leased, the annual rental is usually in the $2,000 to $10,000 range. One company has established a decreasing annual charge that drops to zero after a few years.

The emergence of this marketing activity, however, does not guarantee a solid, long-term software business opportunity. There are problems. The seller is worried about protecting his product; the buyer has little flexibility in using the product; both are vexed with justifying a price on something the user is accustomed to getting free.

Also, the role of computer manufacturers is uncertain. There is a real question as to whether the major manufacturers will ever price some software separately from hardware. If they do, such action should help the independent market. But it is not a likely route to be chosen by the manufacturers because they consider software an integral part of their product and would not want to open its "value-added" contribution to widespread competition. However, the Federal Government has been seeking to identify how much of its computer bill is for software, and firm action by the GSA could force a breakout of software pricing.

Last year, EDP I&MR estimates, sales of prepackaged software by independents were less than $2 million. (See Table 1 for recently announced packages.) We expect this market to grow to many times this amount by 1970, as the number of potential customers is almost as large as the number of computer installations. The business is an easy one to enter, since software-for-sale products are usually paid for by a sponsor, and many firms are likely to prosper over the short haul, at least.

Attractions to buyer and seller

The evolution of software-for-sale is still continuing, but a clear pattern is developing. The business really started when a programmer decided he could sell to other users some specific software package he had developed. Such a case occurred with Computer Usage Co., which developed an IBM 360 COBOL compiler for Prudential Insurance Co., then with the Pru's permission offered it to others.

A more sophisticated approach came when the programming expert started specifying his resale rights in a customer's contract and then developed a more generalized product than the first customer needed. It solved the customer's problem, yet allowed the software firm to realize a profit with several resales. Usually, the original customer was charged 10% or so less than for an "exclusive" package.

In the next step, the one most prevalent at present, the original customer fills a role something like that of a theatrical angel on Broadway. The potential seller looks around and sees a gap, determines that he can fill it, then tries to find some assistance to offset his original costs. The original sponsor, in this

Table 1 - SOFTWARE PACKAGES OFFERED FOR SALE IN RECENT MONTHS

PROGRAM NAME	FIRM	USER MARKET	DESCRIPTION
Accufile	Anagram Corp.	IBM 7090/94	Storage and retrieval system for program specifications, flowcharts, coding, card decks, etc. Cost: $14,400 1st year, $7,200 2nd, none thereafter.
Autoflow	Applied Data Research, Inc.	IBM 7090/94, & 360 series; RCA Spectra 70's	Automatically prepares flow charts from COBOL, FORTRAN, or assembly language computer programs. Cost: $2,000 to $5,000.
Bankserv Credit Card System	Information Sciences Associates	IBM 1401/1460	Set of programs to support credit card systems normally used by banks. Cost: $10,000.
Bank Payroll System	Computer Sciences Corp.	IBM 360's in banks	Payroll program with which bank service centers can handle payrolls. Cost: $15,000.
ESI	Applied Data Research, Inc.	PDP-5, 8, 8/S	English-language conversational interpreter that replaces desk calculator, acts as time-shared terminal.
Exodus	Computer Sciences Corp.	IBM 1410/7010's going to 360	Translation system that converts most 1410/7010 Autocoder instructions to code suitable for Op.Sys./360. Cost: $9,000.
Expand	Computer Communications, Inc.	IBM 1130's	Set of programs that give 1130 commercial ability, such as sort and payroll Cost: $10,000.
40X	Computer Usage Development Corp.	IBM 360/40's	Program that gives more efficient emulation of 1401/1460 programs by handling printing in multi-programmed mode. Cost: $9,500 or $1,000 per month.
FMPS	Bonner & Moore Associates, Inc.	Computers with FORTRAN IV compiler	Highly modular mathematical programming system that can be adapted and modified by user to fit his own need.
Generalized Payroll Systems	Philip Hankins & Co., Inc.	GE 400's IBM 360's	Flexible payroll system designed for bank service centers but with possible other applications.
GIFT	Computer Fulfillment	IBM 360/30's and larger	General information file tester that will create a selected subfile on basis of parameters on customer-punched cards.
Linear Programming Systems	Haverly Systems, Inc.	IBM 1401/60's Honeywell 200's IBM 360's	A number of linear programming systems that require less hardware than the systems available from manufacturer. Cost: $3,000 to $10,000 or rented at $100 to $400 per month.
MACS	Informatics, Inc.	IBM 360's in banks	Handles media placement and accounting, lets advertising agencies make one-check payments each month.
MISSIL	Bonner & Moore Associates, Inc.	IBM 1800's & 1130's	A symbolic management information language upward compatible to IBM's Marble language on 360's.
SDS COBOL-65	Scientific Data Systems, Inc.	Sigma 7's	Unusually full business COBOL compiler; first software package offered for sale by a computer manufacturer. Cost: $20,000

case, doesn't control the specifications but then he only pays 50% or less of what the job would have otherwise cost.

Coming soon, as software firms develop the necessary capital and as there is demand for their products, is the situation in which a market need is determined, an investment is made in a general program to fill this need, and the package is then marketed. Bonner & Moore Associates, for example, decide on a package, then try to line up users as the software is being prepared. Usually, a spokesman says, such programs are underwritten before they are finished.

In the various steps of this process, the initial cost to the seller has risen from very little to almost 100% the total programming effort. At the same time, the cost to additional customers has dropped from some 20% of the original to say 5% or less. Thus, there are definite advantages to both buyer and seller, since both must be attracted if these transactions work. To summarize, the seller has:

- the ability to re-sell the same product, over and over, with practically no production costs;
- in some cases, the possibility of recouping at least part of the programming costs he would have had in any event;
- a growing market base for each product, since each compatible family of machines is used by an increasingly large number of customers;
- little possibility of competition from computer manufacturers, and therefore a more or less permanent market.

There are definite advantages, also, to the buyer of packaged software; it:

- can be tested for suitability before it is bought;
- avoids tedious and often highly sophisticated programming;
- generally gives higher performance than that supplied by the computer's manufacturer.

The manufacturers, indeed, are in a position worth examining in a little more detail. To them, software is frequently considered an expensive, frustrating, but necessary expense item in selling hardware. When software forces the user to pay more rent -- for example, in cases that require more memory than the basic machine configuration, or that call for additional peripherals -- it is happily supplied, since it generates additional revenue. Conversely, however, software that does not directly sell hardware, or even worse that eliminates the need for some expensive equipment, has little chance of being produced by the manufacturer. And software that only a few customers will ever use has little chance of being developed unless it is priced as part of a special systems project.

These are the facts, indeed, which open the door to the independents. For example, IBM didn't supply a linear programming package with its 1400 systems; this might have cut the market for its 7000 series. So operations research specialist Lawrence Haverly stepped in and filled the gap with an LP package. He now runs his own firm, Haverly Systems, Inc., and is also marketing similar packages for Honeywell's 200 series and for IBM's 360 machines.

Another example is similar. IBM didn't offer standard commercial software for the low-cost, scientifically oriented 1130 because it might have undercut the market for 360/20's and 30's. Therefore, Computer Communications, Inc. developed Expand, which allows the 1130 user to do some commercial processing on his machine, and

automatically opened a market for its $10,000 product. In both these cases, neither company really had to risk outright competition from the computer manufacturer . . .the market situation prevented it. These were safe "gaps" for the independent to attack and fill.

A slightly more dangerous gap is the one in which the software for a particular system does not provide some users with full utilization. It is always possible, in such cases, that the manufacturer will offer, free, software that will do the job. This, of course, would effectively kill the market for independent software sales.

Applied Data Research faced such a possibility when it developed Autoflow, a program that flow-charts and analyzes programs written in COBOL, FORTRAN, or assembly language. This product, out for two years now, is considered superior to any similar technique, but ADR had no way of knowing whether or not IBM would announce one equal or similar to it. This hasn't happened, so ADR now is breathing easier . . .and looking for more software opportunities.

Problems inherent in software-for-sale

Competition from computer manufacturers is not the only uncertainty in this market, however. For both buyer and seller alike, there are problems that have to be faced. The big problem for the seller, as has been pointed out, is security; both seller and user, however, face a number of problems that fall into three primary areas -- inflexibility, remoteness, and justification.

Inflexibility. Unlike most programs that the computer user is accustomed to working with, packaged software cannot usually be altered continuously, as is common with self-written programs. Indeed, the seller, in trying to protect his interests, naturally hesitates to provide the full documentation necessary for alteration. Thus, programs must be used as supplied and as a result only certain types of programs are suitable for independent sale.

Also, many computer families, although program compatible, have three or four different operating systems, with different label requirements. This can result in different operating characteristics within a family, and the seller is being forced to bring out special versions for each operating system. This is being done, however, so this problem for the user is vanishing. And these variations can act as a partial safeguard against mass unauthorized distribution of packaged programs.

Remoteness. Lack of on-site support can be a problem for the user, since even the larger software firms have only a few offices, and simply cannot supply the continuous attention offered by computer manufacturers. They have combatted most of this problem by eliminating manual console operations, providing very complete input checking, and writing clear operating instructions.

Maintenance, however, can be a problem. Perfect programs, perfect computers, and "typical" installations just don't exist, and often a program debugged in one installation will produce quite new bugs when run elsewhere, because the pattern of the programs used is somehow different. Hardware or operating system faults are often indistinguishable from program errors, and the software supplier sometimes finds himself having to put expensive time into cases where the computer system, rather than his program, has broken down. After all, when it's his word against that of the large manufacturer, and when he cannot offer full documentation, the

software supplier is the obvious scapegoat. In addition, of course, bugs do crop up in his own programs. These have to be traced and corrected. Then, of course, the same programs have to be checked at all installations where they're in use, and manuals have to be reprinted. At present, there is really no way to estimate the cost of this effort. One company president uses his private plane to check out customer problems; some companies put about 10% of their fees into a special maintenance fund, and hope. Indeed, it will probably take at least another year before valid estimates will be available for planning such costs.

One growing way of bypassing some of the maintenance problem may spell out another direction in which this "industry" may be headed. Some sellers franchise a sophisticated local computer user to sell their services and become partners in the profit. This tends to reduce maintenance calls to a minimum, and may well prove to be the best way for most software firms to handle this problem.

Justification. Few if any people in the computer industry really know how to evaluate and justify software. It is, therefore, difficult for the seller to price his wares and hard for the potential user to justify them. In most cases, management has traditionally considered software a no-cost item and cannot yet see why it should buy it. The problem, thus, is one of education; time and exposure may prove to be the best teacher in many cases.

Protection. Without a doubt, the vendor's major difficulty is protecting his proprietorship in an item that can be reproduced as easily as a computer program. This ease of reproduction, indeed, is one of his prime advantages in offering packaged software as a product.

It is usually impossible to detect whether a program has been copied, and legal sanctions are at best doubtful. Indeed, patenting of programs is being opposed by the Patent Office itself and as far as copyrighting is concerned, no case has yet been brought to court. This method of preventing unauthorized program use is anything but clear. At present, most purchasers honor the agreements under which programs are supplied, but there is no obvious way to insure that this will continue in the future.

One supplier, Anagram Corp., claims to have a system that will foil would-be copiers. If its tapes are copied, the company says, the copy will not work and the original will show signs of having been copied. There are no details; the company says only that it has tested the system carefully, and that "it works."

Generally, though, suppliers take more normal precautions, and hope. Card decks or tapes are tagged so that any unauthorized copies can be traced to the source. And legal possibilities are not ignored. Computer Sciences, for example, is quite emphatic in saying that it will take legal action against any buyer found breaking his contract. . . and doesn't think a programmer will risk his job in working with bootleg programs.

Actually, it would be possible to build a "black box" which would insure that only an authorized program ran on a particular computer. This, however, would have to be built and installed by the computer manufacturer. It seems unlikely, therefore, that this would be done unless the manufacturers were themselves selling software or unless the market were to become far bigger, so that such an attachment would be profitable for the manufacturer. (Either alternative puts the computer manufacturer squarely in the software market.) Thus, the software seller will probably be worried about protection for some time to come.

The potential

The companies introducing software-for-sale are quite varied. Some are consulting or programming firms well-established in the computer industry; others are very young and very small. To some this is a sideline, to others life-blood. The profit potential is there for all, but the eventual winners and the size of the market is difficult to predict.

Computer Sciences' development in the software-for-sale market is typical of the more routine entrance. It developed a program, called "Computax," for checking income tax returns prepared by accountants who subscribed to the system. In 1965, this service -- now handled by a partially owned subsidiary called Computax Corp. -- was being used by over 1000 accountants, but the program itself was not for sale or lease. Later, Computer Sciences developed a payroll program with which banks could provide customer services . . . and marketed it. Now, the company is selling its new "Exodus" program directly to IBM 1410/7010 users who are converting to IBM 360's. The company's primary business is still systems and software development.

One of the most recent entries into software sales is Computer Communications, only formed in November of 1966, partially by people from Control Data. Less than a month after the firm started into operation, it was marketing its "Expand" system that gives small commercial capabilities to the IBM 1130. The firm found a gap that IBM chose not to fill. It had plenty of potential customers, but IBM apparently chose to try to move them to more expensive System 360 equipment for commercial computation. The young company, however, is not going to rely on software sales for everything, as it also is selling remote display entry stations.

Most firms in the market followed paths similar to one of these, or found a spot in between. Indeed, the market is just opening up, and the next several months should see many more entries and more sophisticated methods of operation.

Already, in fact, services are springing up to support this budding business. For the software producers, companies are starting to offer marketing services, much like independent distributors, normally on a per-sale royalty basis. And for the potential software customer, several organizations are starting to publish catalogs of available programs and to list methods of procurement. They started in specific fields such as copyrighted programs (by Program Trade Center) and banking (by American Bankers Association). More services in both these areas are likely to start up before long.

These type services, of course, depend entirely on the success or failure of the software-for-sale market. And this market is full of uncertainties. There is a definite, long-term need for certain types of software: Specialized languages and specific application packages are more and more in demand, but are likely not to be furnished by the manufacturers, unless software contributes directly to sales.

These special packages take lots of technical talent, a scarce commodity. Software firms, in preparing specialized packages for customer sale, can muster this talent together for six months or a year. The ability to prepare good, salable software, however, is still an art. . . not a science. Until, and if this situation changes, the outlook for prosperity in software-for-sale firms will be based on ability to attract and hold the top software "artists" and ability to define carefully the needs of the marketplace.

[Information on software-for-sale continues on next page]

SOME SOFTWARE-FOR-SALE FIRMS ACTIVE IN RECENT DEVELOPMENTS

Below are thumbnail sketches of some of the software-for-sale firms that have recently marketed proprietary software packages. Included in each listing are some of the programs offered for sale or lease (see Table 1). Many new companies are now entering the software-for-sale business each month. This list, therefore, is only representative of the type of companies participating in this market.

Applied Data Research, Inc. (Autoflow, ESI). This Princeton, N. J. company has offices in Los Angeles and Arlington, Va. It is listed Over-the-Counter, with almost 60% of the stock owned by officers and directors of the company. Sales in 1965 were just under $1 million; figures for 1966 are not yet announced but should be quite a bit higher. Founded as a consulting firm in 1959, the corporation tends to seek the unusual in its activities and generally makes a financial success of them. ADR's Proprietary Software Division was formed specifically to sell or lease software systems to computer users, and currently the group has other software packages under development.

Bonner & Moore Associates, Inc. (MISSIL, FMPS). A private consulting firm headquartered in Houston, B&M has a subsidiary in West Germany and holds a majority interest in Profimatics, a West Coast consulting firm. The company, which employs about 60 professionals, prefers to sell software packages, although it will negotiate hourly use charges for smaller organizations. Prices are in the $5,000 to $50,000 range, with most packages selling between $10,000 and $30,000. Bonner & Moore has recently entered the field of technical documentation, preparing manuals both for its own programs and for those of outside customers.

Computer Communications, Inc. (Expand). This new company, formed in November of 1966, has no sales history. Key officials of the corporation came from Control Data Corp. It intends to specialize in both software and hardware development, and in only a few months of operation has introduced a product in each field (see text, Page 7). Emphasis will be in programs and equipment for time sharing.

Computer Sciences Corp. (Bank Payroll System, Exodus). Founded in 1959, this company, which is listed on the American Stock Exchange, has undergone considerable growth. Sales for six months ending Sept. 1966 were $17 million, and should approach $40 million for the fiscal year ending this month, up from only $4 million in 1964. It has made such acquisitions as Communications Systems and System Sciences from ITT, as well as Potter Aeronautical. It also owns slightly less than half the stock in Computax Corp. which markets a CSC developed system for computer preparation of tax returns. Headquartered in El Segundo, Calif., the company has offices in seven major U.S. metropolitan areas.

It has recently formed a Systems Programming Div. to emphasize its software business.

Computer Usage Co., Inc. (40X). The oldest independent computer service organization, this company was founded in 1955. It is headquartered in Mt. Kisco, N. Y., and its stock is traded Over-the-Counter. Sales for fiscal year ending Sept. 1966 were almost $9 million, up from $6 million for the previous year. It has the reputation of being financially conservative -- an unusual characteristic for the computer industry. The company is not neglecting the possibilities of software-for-sale, but appears to be concentrating on system software produced under contract with the computer manufacturer and on business applications, such as personalized letter services, which are marketed. It maintains ten branch offices in the metropolitan U. S. and a staff of over 300 specialists.

Philip Hankins & Company, Inc. (Generalized Payroll System). Established in 1959, this private firm does computer consulting and operates a service center. Total employment is about 75. The software system it offers for sale was prepared specifically for Marine Midland Trust, but later put on the market by the firm. As of now, software-for-sale fits into the firm's future plans, but is not current a big effort.

Haverly Systems, Inc. (Linear Programming Systems). This private firm, headquartered in Denville, N. J., primarily specializes in operations research and linear programming studies. With the spreading use of linear programming, this firm's low-cost systems seem to have good prospects.

Informatics, Inc. (Media Account Control System -- MACS). This Sherman Oaks, Calif. company, founded in 1963, is a subsidiary of Data Products Corp., a manufacturer of peripheral computer equipment. About 10% of Informatics' stock is publicly held and traded Over-the-Counter (as is that of Data Products). Sales for the fiscal year about to end should exceed $6 million, up from $4.5 million for the previous year. The company specializes in design, analysis, programming, and implementation of on-line computer systems. MACS is its first proprietary program to become operational, but it is expanding its activities in new salable software products for specific applications.

Information Sciences Associates (Bankserv Credit Card System). Headquartered in Cherry Hill, N. J., this private consulting firm was founded four years ago. It specializes in planning and implementing new services for banks, and says its present product is the first of a series of ready-to-use systems. A second system will be announced shortly.

REFERENCE DATA FOR DECEMBER 1966

The number of electronic digital computers installed or in production at any one time has been increasing at a bewildering pace in the past several years. New vendors have come into the market, and familiar machines have gone out of production. Some machines have been received with open arms by users -- others have been given the cold shoulder.

To aid readers of the EDP I&MR in keeping with this mushrooming activity, we compile and publish this monthly report on the number of general purpose electronic computers made by American-based companies which are installed or on order as of the preceding month. These figures included installations and orders outside the United States. We update this computer census monthly, so that it will serve as a "box score" of progress in following the growth of the American computer industry, and of the computing power it builds.

In general, manufacturers in the computer field do not officially release installation and on order figures. The figures in this table are developed through a continuing market survey conducted by our research staff. This market research program develops a documented data file on over 80% of the computer installations in the United States. A similar program is conducted for overseas installations.

Comments on this census from informed readers will be welcomed.

AS OF NOVEMBER 10, 1966

NAME OF MANUFACTURER	NAME OF COMPUTER	SOLID STATE?	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS	NUMBER OF UNFILLED ORDERS
Advanced Scientific Instruments	ASI 210	Y	$3850	4/62	25	0
	ASI 2100	Y	$4200	12/63	7	0
	ADVANCE 6020	Y	$4400	4/65	12	5
	ADVANCE 6040	Y	$5600	7/65	6	5
	ADVANCE 6050	Y	$9000	2/66	5	6
	ADVANCE 6070	Y	$15,000	10/65	5	6
	ADVANCE 6130	Y	$1000	11/66	0	15
Autonetics	RECOMP II	Y	$2495	11/58	37	X
	RECOMP III	Y	$1495	6/61	8	X
Bunker-Ramo Corp.	BR-130	Y	$2000	10/61	160	2
	BR-133	Y	$2400	5/64	26	44
	BR-230	Y	$2680	8/63	15	X
	BR-300	Y	$3000	3/59	36	X
	BR-330	Y	$4000	12/60	31	X
	BR-340	Y	$7000	12/63	20	X
Burroughs	205	N	$4600	1/54	43	X
	220	N	$14,000	10/58	34	X
	E101-103	N	$875	1/56	128	X
	B100	Y	$2800	8/64	164	15
	B250	Y	$4200	11/61	84	1
	B260	Y	$3750	11/62	230	4
	B270	Y	$7000	7/62	165	5
	B280	Y	$6500	7/62	130	7
	B300	Y	$10,000	7/65	118	85
	B2500	Y	$5000	1/67	0	40
	B3500	Y	$14,000	5/67	0	30
	B5500	Y	$22,000	3/63	59	13
	B6500	Y	$33,000	2/68	0	8
	B8500	Y	$200,000	2/67	0	1
Control Data Corporation	G-15	N	$1600	7/55	310	X
	G-20	Y	$15,500	4/61	23	X
	LGP-21	Y	$725	12/62	118	X
	LGP-30	semi	$1300	9/56	122	X
	RPC-4000	Y	$1875	1/61	55	X
	160*/160A/160G	Y	$2100/$4000/$12,000	5/60;7/61;3/64	458	5
	924/924A	Y	$11,000	8/61	26	X
	1604/1604A	Y	$45,000	1/60	59	X
	1700	Y	$4000	5/66	30	120
	3100	Y	$11,000	12/64	102	40
	3200	Y	$14,000	5/64	87	X
	3300	Y	$15,000	9/65	55	50
	3400	Y	$25,000	11/64	19	X
	3500	Y	$30,000	9/67	0	10
	3600	Y	$58,000	6/63	50	X
	3800	Y	$60,000	2/66	12	16
	6400	Y	$50,000	5/66	9	18
	6600	Y	$85,000	8/64	20	15
	6800	Y	$130,000	4/67	0	4
Data Machines, Inc.	620	Y	$900	11/65	23	30
Digital Equipment Corp.	PDP-1	Y	$3400	11/60	60	X
	PDP-4	Y	$1700	8/62	57	X
	PDP-5	Y	$900	9/63	115	1
	PDP-6	Y	$10,000	10/64	23	2
	PDP-7	Y	$1300	11/64	95	40
	PDP-8	Y	$525	4/65	490	270
	PDP-9	Y	$1000	12/66	0	60
El-tronics, Inc.	ALWAC IIIE	N	$1820	2/54	16	X
Electronic Associates, Inc.	8400	Y	$12,000	6/65	12	8
Friden	6010	Y	$600	6/63	470	70
General Electric	115	Y	$1800	12/65	200	575
	205	Y	$2900	6/64	44	X
	210	Y	$16,000	7/59	50	X
	215	Y	$6000	9/63	54	X
	225	Y	$8000	4/61	205	X
	235	Y	$10,900	4/64	69	2
	415	Y	$9600	5/64	195	60
	425	Y	$18,000	6/64	82	44
	435	Y	$25,000	9/65	30	18
	625	Y	$50,000	4/65	20	18
	635	Y	$56,000	5/65	18	22
	645	Y	$90,000	7/66	2	10
Honeywell	DDP-24	Y	$2500	5/63	82	3
	DDP-116	Y	$900	4/65	130	40
	DDP-124	Y	$2050	3/66	20	40
	DDP-224	Y	$3300	3/65	42	11
	H-120	Y	$3800	1/66	270	300
	H-200	Y	$7500	3/64	910	130
	H-400	Y	$8500	12/61	116	X
	H-800	Y	$30,000	12/60	90	2
	H-1200	Y	$8000	2/66	25	80
	H-1400	Y	$14,000	1/64	12	1

REFERENCE DATA FOR DECEMBER 1966

NAME OF MANUFACTURER	NAME OF COMPUTER	SOLID STATE?	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS	NUMBER OF UNFILLED ORDERS
Honeywell (cont'd)	H-1800	Y	$42,000	1/64	18	1
	H-2200	Y	$13,000	1/66	15	55
	H-4200	Y	$20,500	3/67	0	6
	H-8200	Y	$35,000	3/68	0	2
	DATAmatic 1000	N	$40,000	12/57	2	X
IBM	305	N	$3600	12/57	145	X
	360/20	Y	$2000	12/65	925	6300
	360/30	Y	$7500	5/65	2200	4500
	360/40	Y	$15,000	4/65	1100	1500
	360/44	Y	$10,000	7/66	15	150
	360/50	Y	$26,000	8/65	130	550
	360/62	Y	$55,000	11/65	1	X
	360/65	Y	$50,000	11/65	24	210
	360/67	Y	$75,000	10/66	2	65
	360/75	Y	$78,000	2/66	14	30
	360/90 Series	Y	$140,000	6/67	0	10
	650	N	$4800	11/54	172	X
	1130	Y	$1200	11/65	500	3800
	1401	Y	$6600	9/60	7700	200
	1401-G	Y	$2300	5/64	1600	50
	1410	Y	$14,200	11/61	805	70
	1440	Y	$4800	4/63	3300	150
	1460	Y	$11,500	10/63	1800	60
	1620 I, II	Y	$4000	9/60	1680	20
	1800	Y	$7600	1/66	60	300
	701	N	$5000	4/53	1	X
	7010	Y	$22,600	10/63	212	6
	702	N	$6900	2/55	6	X
	7030	Y	$160,000	5/61	6	X
	704	N	$32,000	12/55	32	X
	7040	Y	$22,000	6/63	120	4
	7044	Y	$32,000	6/63	125	5
	705	N	$38,000	11/55	52	X
	7070, 2, 4	Y	$27,000	3/60	325	X
	7080	Y	$55,000	8/61	85	X
	709	N	$40,000	8/58	9	X
	7090	Y	$63,500	11/59	45	X
	7094	Y	$72,500	9/62	117	2
	7094 II	Y	$78,500	4/64	127	5
National Cash Register Co.	NCR - 304	Y	$14,000	1/60	25	X
	NCR - 310	Y	$2500	5/61	20	X
	NCR - 315	Y	$8500	5/62	365	90
	NCR - 315-RMC	Y	$12,000	9/65	64	70
	NCR - 390	Y	$1850	5/61	1030	40
	NCR - 500	Y	$1500	10/65	620	780
Philco	1000	Y	$7010	6/63	16	X
	2000-210, 211	Y	$40,000	10/58	16	X
	2000-212	Y	$52,000	1/63	12	X
Radio Corporation of America	RCA 301	Y	$7000	2/61	644	2
	RCA 3301	Y	$17,000	7/64	67	7
	RCA 501	Y	$14,000	6/59	96	X
	RCA 601	Y	$35,000	11/62	5	X
	Spectra 70/15	Y	$4100	9/65	70	110
	Spectra 70/25	Y	$6700	9/65	40	65
	Spectra 70/35	Y	$10,400	7/66	10	90
	Spectra 70/45	Y	$17,400	11/65	20	100
	Spectra 70/55	Y	$40,500	11/66	0	12
Raytheon	250	Y	$1200	12/60	175	X
	440	Y	$3500	3/64	16	3
	520	Y	$3200	10/65	19	6
Scientific Control Systems	650	Y	$500	5/66	3	7
	655	Y	$1800	10/66	0	2
	660	Y	$2000	10/65	5	3
	670	Y	$2600	5/66	1	2
Scientific Data Systems Inc.	SDS-92	Y	$1500	4/65	64	30
	SDS-910	Y	$2000	8/62	186	6
	SDS-920	Y	$2900	9/62	135	10
	SDS-925	Y	$3000	12/64	28	10
	SDS-930	Y	$3400	6/64	132	18
	SDS-940	Y	$10,000	4/66	6	11
	SDS-9300	Y	$7000	11/64	32	8
	Sigma 2	Y	$1000	12/66	0	140
	Sigma 7	Y	$12,000	12/66	0	25
Systems Engineering Labs	SEL-810/810A	Y	$1000	9/65	28	8
	SEL-840/840A	Y	$1400	11/65	3	6
UNIVAC	I & II	N	$25,000	3/51 & 11/57	26	X
	III	Y	$20,000	8/62	77	X
	File Computers	N	$15,000	8/56	16	X
	Solid-State 80 I, II 90 I, II & Step	Y	$8000	8/58	250	X
	418	Y	$11,000	6/63	95	38
	490 Series	Y	$35,000	12/61	110	54
	1004	Y	$1900	2/63	3200	50
	1005	Y	$2400	4/66	425	275
	1050	Y	$8000	9/63	290	40
	1100 Series (except 1107)	N	$35,000	12/50	10	X
	1107	Y	$55,000	10/62	29	X
	1108	Y	$65,000	9/65	25	52
	9200	Y	$1500	6/67	0	550
	9300	Y	$3400	6/67	0	150
	LARC	Y	$135,000	5/60	2	X
				TOTALS	37,309	23,328

X = no longer in production.

* To avoid double counting, note that the control Data 160 serves as the central processor of the NCR 310. Also, many of the orders for the IBM 7044, 7074, and 7094 I and II's are not for new machines but for conversion from existing 7040, 7070, and 7090 computers respectively.

REFERENCE DATA FOR DECEMBER 1966

STOCK MARKET REPORT ON SELECTED EDP FIRMS

November 25, 1966 - December 9, 1966

NEW YORK STOCK EXCHANGE	1966 High	1966 Low	2 weeks Sales in 100's	2 weeks High	2 weeks Low	Last	2 weeks Net Change	2 weeks % Change
Addressograph-Multigraph	77 3/8	50 1/2	1795	55 3/4	51 5/8	54 1/2	+2 1/8	+4.06
American R & D	44 3/4	20 1/4	474	42 3/8	39 1/8	39 5/8	+3/8	+0.95
Ampex Corp.	27 5/8	17	3040	25 3/8	22 3/4	24 3/4	+3/4	+3.12
Burroughs	88 1/2	49 1/4	2862	88 1/8	79 3/4	86 3/4	+4 1/2	+5.47
Collins Radio	85 3/8	37 5/8	2171	61 1/2	57	58 1/2	-1 5/8	-2.70
Control Data	39 1/4	23 5/8	3986	35 1/2	30	33 7/8	+2 1/2	+7.97
Electronic Assoc.	27 1/8	12 1/4	885	19 1/8	15 3/8	18 5/8	+2 3/8	+14.61
General Electric	120	80	1072	100 1/8	96 3/4	97 1/2	+1/4	+0.26
Honeywell	96	53 1/2	3165	64 5/8	54 3/8	60 7/8	+6	+9.57
IBM	384	289 1/2	1254	384	365 1/4	376 1/2	+10 1/4	+2.78
Inter. Tel & Tel	79 3/8	58 1/8	1352	76 1/4	73	75 1/4	+1 3/8	+1.86
Litton	86 1/2	56 5/8	1899	83 3/8	76 3/4	81	+3 1/4	+4.18
Nat Cash Register	91 1/2	59	1436	71 1/4	62 3/4	69 1/8	+6 1/8	+8.53
RCA	62 1/4	36 3/4	3273	48 1/2	43 1/4	48	+4 1/8	+9.40
Raytheon	56 7/8	36	2423	53 3/4	50 5/8	53	+1 1/4	+2.41
Scientific Data	81 1/8	41 1/4	1281	61 7/8	55	55 1/2	-2 5/8	-4.52
SCM	91 7/8	42 1/8	5693	65 1/8	55 3/4	62 7/8	+4 1/4	+7.25
Singer	64 3/4	39 3/8	1513	47	40 1/2	44 5/8	+3 3/8	+8.18
Sperry Rand	33 5/8	17 1/8	9019	29 1/4	26 5/8	28 1/2	+1 3/8	+5.07
Teledyne	133	50 3/8	2292	87 1/2	76 3/4	82 1/4	+4	+5.11
NYSE COMPUTER STOCK AVERAGE							+2.50	+4.68
AMERICAN STOCK EXCHANGE								
ANelex	28	7 3/8	1094	13 1/8	8 1/8	12 3/4	+4 1/4	+50.00
Audio Devices, Inc.	41 1/4	17	292	21 3/8	19 5/8	21	+1/2	+2.44
Bunker-Ramo	10 1/2	4 5/8	2294	8 1/4	6 1/8	7 5/8	+1 3/8	+22.00
Cal Comp	33	13 1/4	820	33	25 1/8	31 5/8	+6 1/4	+24.63
Clary	8	3 5/8	148	4 3/8	3 7/8	4 1/4	+3/8	+9.68
Computer Application	26 1/4	8	394	12 3/8	8 1/2	11 3/4	+2 1/4	+23.68
Computer Science	37 1/4	15 1/4	474	23 1/4	19 1/2	22	+1	+4.76
Digital Equipment	35 1/2	27 1/4	967	35 1/2	30 5/8	30 5/8	-2 7/8	-8.58
Leasco Data Proc Equip Corp	40 1/2	18 1/2	895	33 3/8	24	30 5/8	+4 3/4	+18.36
Levin-Townsend Comp Corp	26 7/8	8 1/2	225	11 1/4	8 5/8	10 1/8	+1 1/8	+12.50
Milgo Electronics	8 7/8	4	81	6 1/2	5 3/8	5 3/4	-1/2	-8.00
Planning Research	36 1/2	12 7/8	176	20 3/4	16 1/8	20 3/4	+4 1/2	+27.69
Potter Instrument	26 3/8	9 1/8	220	12 1/2	10 3/4	11 7/8	-1/8	+1.04
AMEX COMPUTER STOCK AVERAGE							+1.81	+13.82

OVER-THE-COUNTER	1966 High Bid	1966 Low Bid	December 9 Bid	December 9 Asked	2 weeks ago Bid
Applied Data Research, Inc.	6 3/4	2 1/4	2 1/2	2 7/8	2 1/4
Aries Corp.	8 1/2	3	8 5/8	9	8 1/2
Automatic Data Processing	28 1/4	21 3/4	27 3/4	28 3/4	26
Bolt, Beranek & Newman, Inc.	16	7 1/2	7 3/4	8 1/4	7 7/8
C-E-I-R	15 1/4	5 3/4	6 3/8	6 3/4	5 7/8
Computer Usage	24 1/2	16 3/4	21 3/4	22 3/4	19 1/2
Data Products	4	2 1/4	2 3/4	3	2 1/4
Digitronics	12 3/4	4 3/4	6 3/4	7 1/4	5 3/4
Documentation, Inc.	8 1/2	3 3/8	3 3/8	3 5/8	3 3/8
DPA, Inc.	19 7/8	3 5/8	5 1/4	5 5/8	5 1/4
Electronic Memories	26	10	11 5/8	11 7/8	12 1/2
Fabri-Tek	26	5 3/4	6 1/8	6 1/2	6 1/8
Informatics, Inc.	8 1/2	7 1/2	7 3/4	8 1/4	7 5/8
Management Assistance	45 3/4	11 1/4	13	13 3/8	14 1/4
Memorex	72 1/4	31 1/2	71	72	59 3/4
Mohawk Data Sciences	46	19	30 3/4	31 1/4	23
Randolph Computer Corp	21 3/4	10	11	11 3/4	10 3/4
Recognition Equipment, Inc.	72	33	41 1/2	43 1/2	33 1/2
Systems Engineering Labs			--	7	5 3/4
University Computing Co.			18 1/4	18 3/4	17 1/4

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E|D|P
INDUSTRY AND
MARKET REPORT

A SEMI-MONTHLY NEWSLETTER FOR EXECUTIVES
IN THE ELECTRONIC DATA PROCESSING INDUSTRY,
AND THE FINANCIAL COMMUNITY.

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Company Profile

HONEYWELL CAPTURES SECOND SPOT IN COMPUTER SHIPMENT RANKINGS FOR 1966; PROSPECTS FOR PROFITS LOOK BRIGHT

Honeywell's Computer Group compiled a remarkable scorecard during 1966. It managed to:

- Ship $270 million or 7.4% of the total $3.7 billion of computer equipment shipped throughout the world in 1966 by American-based firms.
- Increase its computer shipments by over 50% during the year, from some $175 million shipped during 1965. Three years ago, in fact, Honeywell had a total of only $110 million in computer equipment installed.
- Capture a firm second place in terms of annual computer shipments, leaving nearest competitor Control Data behind by some $70 million.
- Achieve steady profitability for its domestic computer operations for the first time. . . paradoxically, during the very period of record shipments of leased computer systems.
- Triple the size of its computer operations since 1964 in terms of manufacturing facilities, employees, and marketing activity.
- Achieve record revenues estimated at $188 million, or some 21% of Honeywell, Inc.'s total expected revenue for 1966. This is a 76% increase from estimated revenues of $107 million recorded in 1965.

Table 1 provides a breakdown of the value of new production computer equipment shipped during 1966 by American-based firms. Table 2 shows how Honeywell's Computer Group was able to achieve its record total of $270 million in shipments.

TABLE 1 - SALES VALUE OF 1966 NEW COMPUTER SHIPMENTS WORLDWIDE BY U. S.-BASED FIRMS

Manufacturer	Sale Value of New Computer Systems Shipped During 1966 ($ Millions)	% of Total Shipments
IBM	$ 2,500	68.3%
Honeywell	270	7.4%
Control Data	200	5.5%
Univac	195	5.3%
GE	190	5.2%
NCR	95	2.6%
RCA	95	2.6%
Burroughs	60	1.6%
SDS	30	0.8%
Others	25	0.7%
Total	$ 3,660	100%

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TABLE 2 - PROFILE OF HONEYWELL COMPUTER SHIPMENTS - 1966

Model	No. of Systems Installed Dec. 31, 1965	No. of Systems Installed Dec. 31, 1966	Net System Shipments 1966	Average System Value	Estimated Total Value Shipped
H-120	2	350	348	$170,000	$59,160,000
H-200	570	1014	444	335,000	148,740,000
H-400	122	115	(-7)	380,000	---
H-800	86	89	3	1,260,000	3,780,000
H-1200	0	65	65	350,000	22,750,000
H-1400	12	12	0	630,000	---
H-1800	16	21	5	2,250,000	11,250,000
H-2200	0	20	20	540,000	10,800,000
DDP-24*	70	87	17	110,000	1,870,000
DDP-116*	35	145	110	39,600	4,356,000
DDP-124*	0	26	26	90,200	2,345,200
DDP-224*	15	50	35	145,200	5,082,000
					$270,133,200

*Computers of Computer Control Division, acquired as Computer Control Co. in May, 1966.

Background

The groundwork supporting Honeywell's achievements in the computer market during the past year was laid early in 1962 when the company evolved its marketing strategy for its current computer product line. At that time Honeywell decided to make a direct competitive attack on the largest single customer base for IBM computers, the users of some 10,000 IBM 1400 series computers.

Honeywell correctly foresaw that IBM's as yet unannounced 360 system would not offer any direct program compatibility with the 1400 series computers. This was because IBM wanted a single new line that would serve both business users of its 1400 or 7000 series and scientific/engineering users of its 7000 series. To do this, IBM had to blend the better features of both previous computer series with advanced communications processing capability. Such an integrated series of computer processors would need an instruction set and data codes incompatible with any previous IBM computer model. Therefore, Honeywell purposefully designed its new computer to provide the IBM 1400 series computer user a more productive price/performance ratio, while at the same time preserving the user's investment in programming. It did this by making the instruction set and data codes of the new Honeywell computers sufficiently similar to that used in the IBM 1400 series that a direct translation of programs to the new Honeywell computers could be achieved.

The well-known result of this product concept is the Honeywell Series 200, consisting of six models, the 120, 200, 1200, 2200, 4200, and 8200. The attractions of this equipment to the IBM 1400 series user are:

1. Conversion to a 200 series computer can be accomplished with little reprogramming, through a program translation process -- labeled Liberator -- without sacrificing many of the advanced processing capabilities of the Honeywell system. Conversion to IBM's 360

involves either a very expensive effort of total reprogramming, or else "emulation" of the 1400 object programs. With the emulation technique, the full capabilities of the 360 system are not realized (although paid for), and the 1400 series programs must be maintained in machine language.

2. The retraining of personnel familiar with 1400 series equipment is minimal when converting to the new Honeywell computers, since the 200 series processors use the same data structure and largely the same instruction set as the 1400 series processors. Conversion to the IBM 360 usually requires extensive retraining of current personnel.

3. Because the 200 series is programmed with instructions comparable to those of the 1400 series, Honeywell can offer with the 200 a wide selection of time-proven software founded on the five years of programming experience accumulated with 1400 series equipment. In contrast, 360 software is relatively new and early in the debugging process. . . and as such, relatively low in efficiency, and high in uncertainty as to error-free performance.

4. The processing speeds of the 200 series computers are three to six times faster than comparable processors of the 1400 series. This is due to the faster memory cycle time of the 200 series, as well as to the simultaneous read-write-compute capability of the system. In addition, the performance of 200 series units compares favorably with comparable processors of the IBM 360 line.

5. The delivery period for the 200 equipment is considerably shorter than for the 360. Honeywell can frequently provide a Model 120 or 200 processor within three to six months from the order date. Delivery on a comparable 360 model is usually between 18 and 24 months from the order date.

Of course, by incorporating 1401 programming features into the 200 series, Honeywell placed reduced emphasis on some "third generation" capabilities. For example, a 6-bit character code is used, rather than the 8-bit character representation used in the 360 and rapidly being recognized as an industry standard. In addition, Honeywell has, up to the present, not offered extensive multiprogramming facilities with the most popular members of the 200 series, while IBM has put heavy emphasis on this capability in the 360. For example, 360 systems over 65K characters (bytes) of core storage have extensive multiprogramming capabilities, while 200 processors of a comparable size are generally limited to one foreground and one background problem running concurrently. (However, we expect Honeywell to make a mid-January announcement of a substantial improvement in the capabilities of the 1200, 2200, and 4200 processors in the multiprogramming area. Processors will be enhanced with advanced memory allocation and protection features, including base index registers and index barricade registers to permit more efficient multiprogramming and processing of remote terminal inputs.)

However, the technical and market success of Honeywell's concept in designing its 200 series is undeniable. To date, Honeywell has converted over 250,000 IBM 1400 series programs for some 800 of its 200 series users who previously had 1400 equipment installed, and the backlog of 200 series orders from former 1400 series users currently stands at over $120 million!

Business growth from sales to current customers

Of course, from now on a major share of Honeywell EDP's new business, like that of other computer manufacturers, will come from upgrading and expanding the computer systems of current customers. Therefore, the attitude of Honeywell customers -- both users of older products as well as those with the current 200 family -- is an important indicator of the future business potential for the company. To assess this attitude, we recently surveyed by telephone users of each of Honeywell's major computer systems. We selected at random ten users of each model from our Computer Installation Data File and asked each of them the following questions:

1. How do you rate your Honeywell computer hardware in light of your expectations for it?
2. How do you rate Honeywell's software and programming support for your system?
3. How do you rate Honeywell's maintenance service for your system?
4. How do you rate Honeywell's training program for your personnel?
5. How long do you expect to continue to use your current Honeywell computer system?
6. Is it likely that your next computer will also be from Honeywell?
7. Where is improvement most needed in Honeywell's performance for you as a customer?

A summary of the results of this survey, along with a capsule sketch of each of the computer models involved, follows:

H400/H1400

Current Status: The H400 is a small- to medium-scale business oriented computer first delivered in December, 1961. It offered a core memory capacity of 1K to 4K 48-bit words. Cycle time was 9.25 usec. per 24-bit half-word. Rental ranged from $5000 to $14,000 per month ($8500 average). The H400, which had reasonable sales success, found its main market among banks, insurance companies, and medical service firms. By the end of '66 about 115 were still installed, seven units having been retired during the course of the year. About 50% of these units are rented from Honeywell.

The H1400 was introduced as a program-compatible big brother to the H400. It offered expanded core capacity of up to 32K 48-bit words and some real-time application features. Cycle time was reduced to 6.5 usec. for the 24-bit half-word. Rental ranged from $9000 to $18,000 per month ($14,000 average). First delivery was made in January, 1964. The H1400 never achieved much market success because the announcement of the new 200 series was made before the first H1400 was delivered, thus transferring customer attention to the new product line. By the end of '66 only 12 systems were installed, with about 83% of these rented from Honeywell.

Customer Survey

Hardware Performance: Excellent, with uptime generally greater than 95%. H1400 users report their computers run a minimum of 30% faster than their former H400's.

Software Support : H400 users complained that they are now on their own in developing software, because Honeywell has shifted its

effort to the H1400. At the same time, H1400 users reported that the software they are getting is not as extensive, has more errors, takes longer in compilation than expected.

Maintenance Service : Excellent. Most users have an on-site maintenance man.

Customer Training : Very good, although it was only used to a limited extent.

Continued Use : Interestingly, most current customers plan considerable additional use from their H400 or H1400. One reports he will use his H400 "until it drops dead."

Manufacturer of Next Computer: About 25% of the users had definite plans to move to third-generation computers, mainly the 200 series.

Suggestion for Improvement: Improve calibre and performance of sales and maintenance personnel. Seek the "knowledgeable air" of IBM's staff. Continue development of COBOL for H400/H1400.

H800/H1800

Current Status: The H800 is a medium- to large-scale system first delivered in December, 1960. It was the first computer to offer multiprogramming capability in a major computer system, although lack of adequate memory protection features handicapped the application of this feature. Core memory size is from 4K to 32K 48-bit words and the cycle time is 6 usecs. Rental range is from $18,000 to $40,000 per month (average $28,000). The H800 achieved good sales success. Utilities, insurance companies, and military departments provided the major markets. By the end of '66, approximately 89 units were installed. About 40% of these were rented from Honeywell.

The H1800 is a large-scale, program compatible big brother to the H800, with twice the core storage capacity (up to 64K) and one-third the cycle time (2 usec.) as the H800. Rental range is from $30,000 to $60,000 per month ($42,000 average). First delivery was made in January, 1964. Most sales have been as a replacement system for H800 customers. By the end of '66, about 21 systems were installed. About 80% of these were rented from Honeywell.

Customer Survey

Hardware Performance: Users rated their central processors as very good to excellent, but complained of the noise and poor endurance of their card reader/punch unit (IBM-made) and their printer.

Software Support : Users felt that software was initially shaky, but has improved to a point where it can be rated as "very good".

Maintenance Service : Very good.

Customer Training : Most users employ Honeywell's training as a foundation upon which to build. According to one user, "It's good... as far as it goes."

Continued Use : Most users expect to update their configuration with random access memory units and data communications equipment. Three to five years of future use is foreseen.

Manufacturer of Next Computer: Nearly all users expect to stay with Honeywell for the applications they are currently running. Some expect to tackle new applications with competitive equipment.

Suggestion for Improvement: Replace line printer and IBM card reader/punch with improved peripheral units.

H120

Current Status: The H120 is the smallest member of the 200 family. However, it can be used as a tape or disc system as well as a card machine. It can handle

two or three I/O operations concurrently with processing. Core memory range is from 2K to 32K characters, with a cycle time of 3 usec. per character. Rental ranges from $1900 per month for a small card system to $4000 per month for a tape or disc system. The H120 is currently Honeywell's hottest seller in terms of number of units. First delivery was made in January, 1966. By the end of '66, 350 units were installed. About 96% of these systems are leased from Honeywell, with some 70% of these on three- or five-year contracts.

Customer Survey

Hardware Performance: Rated generally excellent. Only problems reported were with both IBM's and Honeywell's new card reader/punch units.

Software Support : COBOL and EASYTAB were rated very good. Early problems with FORTRAN due to high memory requirements for I/O control. Software documentation reported weak but improving.

Maintenance Service : Very good. Rapid response to calls.

Customer Training : Only about one-half of customers used Honeywell's training program. In major urban areas training was considered good, but other regions reported limited facilities and inadequate training for operators.

Continued Use : All customers asked expect to upgrade within the 200 series.

Manufacturer of Next Computer: Too far in future to predict. Immediate plans are for upgrading as above.

Suggestion for Improvement: Lack of prompt and precise communication seems to be Honeywell's major problem with these small computer users. As one put it, "The software is there and it's good, but the documentation on it isn't clear or up to date." Also, the quality and quantity of the sales and service staff in new sales territories could be improved.

H200

Current Status: The H200 was the first member of the 200 family to be introduced, the first to be installed, and it is currently Honeywell's largest revenue producer. It is a small- to medium-scale computer which can act as a stand-alone processor or as a satellite in an integrated system. It can handle three or four I/O operations concurrently with processing. Core memory range is from 4K to 64K characters, with a cycle time of 2 usec. per character. Rental ranges from $2600 for a small card system to $9800 for a full tape or disc system. First delivery was made in March, 1964. By the end of '66, about 1014 systems were installed. About 90% of these were on lease, with 75% on three- or five-year contracts.

Customer Survey

Hardware Performance: Users rated the hardware as generally excellent. The IBM card reader/punch unit was the only item singled out as causing difficulty.

Software Support : Users rated Honeywell's basic software as fine but almost every user reported problems in acquiring and using the more sophisticated pieces of software involved with the operating system or mass storage units.

Maintenance Service : Very Good.

Customer Training : Ratings ranged from "not impressive" to "exceptionally good." The rating generally depends on the quality of the individual instructor.

Continued Use : Two-thirds of the users questioned had definite plans to upgrade their current system with more memory, tape and/or discs, or to replace it with an H1200 or H2200.

Manufacturer of Next Computer: One-third of the customers questioned were undecided about their future plans or were switching to a competitor. Most people switching were service bureaus going to 360's to remain compatible with their major customers.

Suggestion for Improvement: Speed development of Honeywell's own card equipment and random access memory units. Improve availability and documentation of advanced software.

H1200

Current Status: The H1200 is a medium-scale computer system that serves as a half-way point in the 200 family. Like the H200, it can handle four I/O operations concurrently with processing. It also offers core memory expansible to 128K characters with a cycle time of 1.5 usec. per character. In addition, it has memory protection features for communications processing and the option of floating-point arithmetic for scientific operations. Rental ranges from $7800 to $16,000 per month. First delivery was made in February, 1966. By the end of '66, 65 systems were installed. About 90% of the systems are leased, with some 70% of the leases being three- or five-year contracts.

Customer Survey

Hardware Performance: Ratings ranged from good to very good, with only IBM card reader/punch problems marring the thruput of several users.

Software Support : Most users find that the basic software packages perform well but complain that the more sophisticated packages are either not available or perform slower than expected. Users note that Honeywell's software documentation should state more clearly what can and cannot be done with various software packages.

Maintenance Service : Good to excellent.

Customer Training : Generally good. Program for machine operators rated weak.

Continued Use : Since users have had their H1200 for less than a year, future plans are not well developed. However, all users questioned said they expect to stick with Honeywell.

Manufacturer of Next Computer: Probably Honeywell, as above.

Suggestion for Improvement: Improve software documentation. Better communications between home office and field staff on what's available in the area of software and training. Improve education program for top management to make it comparable with that offered by IBM.

H2200

Current Status: The H2200 is the largest member of the 200 family that has been delivered to date. It can handle either four or eight I/O operations concurrently with processing. It offers the hardware features of the H1200 with a core memory expansible to 256K characters and a cycle time of 1 usec. per character. Rental range is from $9400 to $20,000 per month. First delivery was made in January, 1966. By the end of '66, 20 systems were installed. About 85% of these systems are leased, with 70% on three- or five-year contracts.

Customer Survey

Hardware Performance: Very good.

Software Support : Weak to date. Late software delivery reported. Ability to run a background and a foreground problem in communications processing not yet available. Situation is improving.

Maintenance Service : Excellent.

Customer Training : Only used in limited manner. Need better operator training.
Continued Use : Users are looking to the H4200 and H8200 as expansion possibilities. Since these machines will not be available for a year or more, users keeping their position "flexible."
Manufacturer of Next Computer: Users report they are "keeping an open mind" since they are on the top of the product line currently delivered by Honeywell.
Suggestion for Improvement: Let field staff and customers know frankly the current limitations of H2200 software and the schedule of plans for improvement. Let customers participate more in design and development of software.

Key factors indicating Honeywell's future

Honeywell's future in the computer business looks quite bright. This prognosis is based on a number of factors:

1. Strengthened capability in process systems. During 1966, Honeywell consolidated and strengthened its computer activities when, in May, it acquired the Computer Control Co., Framingham, Mass. To this, the company added its process control computer activity, formerly in Philadelphia, to form the Computer Control Div. This new division now gives Honeywell a strong design, engineering, and marketing capability with which to serve customers needing computers for data transmission, data conversion, process control, and scientific instrumentation. In particular, it gives Honeywell an enhanced capability in the market for computerized industrial instrumentation systems, an area where Honeywell's reputation for control instruments has made its name world famous.

The Computer Control Div. is geographically convenient to the EDP Div. (together they make up Honeywell's Computer Group). The combination of the EDP Div.'s business data processing expertise with the Computer Control Div.'s experience in direct digital control of processes should make Honeywell a strong factor in the market for production-oriented management control systems. Such systems would use computers to control the steps of the production process, automatically handle inventory updating, and feed data into a management information system to be used by executives for timely analysis and decision-making. The market for such systems in the next five years is expected to be substantial.

The Computer Control Division contributed an estimated $27 million to revenues during 1966. It expects to double sales within the next three years. In the works already is a major plant expansion that will increase by 50% the division's facilities by mid-67.

2. Industry marketing. Honeywell is focusing its sales energies and associated programming and system skills in selective market areas. Emphasis is being placed on major computer markets such as: manufacturing, retailing, insurance, state and local government, transportation, and finance.

Honeywell is backing up each of these industry marketing efforts with application packages tailored to the needs of each industry, and already has developed some 60 of these industry packages. To fortify this program, it plans during the coming year to increase by 50% its investment in customer programming support. In addition, it is placing an industry specialist in each major sales office. This industry marketing approach, which closely parallels -- although on a smaller scale -- that taken by IBM, should provide Honeywell with an improved

return on its marketing investment. To date it has some outstanding successes. For example, Honeywell currently claims some 25% of the independent service bureaus.

3. IBM 360 difficulties. Honeywell is benefiting considerably from the delivery delays and programming difficulties of the IBM 360 equipment. These difficulties have been well publicized in the industry, and quite a number of customers who initially placed 360 equipment on order are turning to Honeywell to "get off the fence" and opt for a system with proven software and a safe, economical approach to relatively unsophisticated data processing. Obviously, as time passes IBM will solve its 360 problems and this factor's importance will lessen.

4. Peripheral equipment. Honeywell has steadily improved its peripheral equipment capability. It is expected to be able to overcome field difficulties with the IBM reader/punch equipment used with its 200 series by installing its own unit in quantity during the coming year. Also, Honeywell is improving the troublesome quality of its drum printer. In addition, Honeywell added a series of cathode ray tube (CRT) display terminals, made by Bunker-Ramo, and MICR reader/sorters to its peripheral line during 1966. But probably the most important peripheral advance this last year was Honeywell's adding a line of disc pack mass storage drives to the 200 series. The disc pack drives, being supplied by Control Data, allow Honeywell for the first time to offer "Liberation" service to the substantial number of 1400 series users who are disc-oriented. Previously, 1400 series disc users could not take advantage of Honeywell's translation programs.

5. Personnel. Honeywell's rapid growth in an industry where trained, experienced personnel are in short supply has inevitably led to problems caused by "greenhorns" on the sales and customer support staff. As our user survey indicates, one of the main complaints of its customers is Honeywell's shortage of experienced, knowledgeable sales and service personnel, and the resulting lapses and errors in communicating technical and programming information about the customer's system. Honeywell is currently putting heavy stress on home office as well as field training for its sales and service personnel. It reports, in fact, that 20% of its outlays for field maintenance now goes into training.

We expect Honeywell to broaden further its training activity in the near future by establishing a Systems Institute similar to the Technical Institute set up by Control Data. Such an institute would allow Honeywell to run a formal training program for manufacturing, maintenance, and technical personnel interested in entering the computer industry and support the cost of the program from student tuition fees. Graduates of such an institute would not only enrich the personnel pool from which potential customers could draw, but would also supply Honeywell with a reservoir of trained personnel from which to select the best qualified as additions to its own staff.

6. International operations. Honeywell's international computer operation, though not profitable at present, can be expected to make an important contribution to the company's success during the next five years. In 1966, 10-15% of Honeywell's computer shipments were made to users outside the U.S. In contrast, some 20-25% of new computer orders now come from organizations outside the U.S.

Honeywell's international computer operation has tripled in size in three years. It now has some 1200 sales, production, and support personnel in over 25 locations; in addition it manufactures 200 series computers at a plant in Newhouse, Scotland, and maintains 12 education and data centers for customer support. The most important markets are in England, Germany, Canada, and Australia. Nippon Electric is Honeywell's computer licensee in Japan. On the basis of its

TABLE 3 - ESTIMATED HONEYWELL COMPUTER GROUP REVENUE -- 1966

Model	No. of Systems Purchased in 1966	Average Discounted Purchase Price*	Est. Total Rental-months of Use During 1966#	Average Monthly Rental Income	1966 Revenues
	8	$190,000+			$1,520,000
400			730	$ 8,500	6,205,000
	1	315,000+			315,000
1400			120	14,000	1,680,000
	3	940,000			2,820,000
800			425	28,000	11,900,000
	2	1,845,000			3,690,000
1800			200	42,000	8,400,000
	12	161,500			1,938,000
120			1500	3,900	5,850,000
	28	288,100			8,066,800
200			7800	8,400	65,520,000
	7	332,500			2,327,500
1200			200	8,000	1,600,000
	3	512,000			1,536,000
2200			70	12,000	840,000
				Sub-Total	124,208,300

Revenue from purchase-leaseback of computer equipment.	35,000,000
Lost rental revenue during 1966 from equipment on purchase-leaseback	-6,000,000
Income from sale of computer supplies, peripheral equipment to OEM's and users of purchased computers	8,000,000
Computer Control Division Revenues	27,000,000
Total Revenue	$188,208,300

* Discounted price reflects average rental credits accrued by customers toward the purchase price during their use period.

\# Compare Table 2. Figure takes into account use of 1966 deliveries for part-year.

\+ Sold during 1966 at 50% discount from list price.

N.B. Revenue estimates include approximately $4.5 million in rental revenues from computers installed within Honeywell, Inc. for internal applications. This amount would not usually be reported by the company as part of annual revenue.

TABLE 4 - HONEYWELL EDP EQUIPMENT ON LEASE AS OF JANUARY 1, 1967

Model	Number of Units On Lease	Average Monthly Rental	Purchase Value	Total Monthly Rental Income ($1000's)	Total Purchase Value ($1000's)
400	57	$8500	$190,000	$485	$10,830
1400	10	14,000	315,000	140	3150
800	34	28,000	940,000	952	31,960
1800	16	42,000	1,845,000	672	29,520
120	337	3900	161,500	1314	54,425
200	904	8400	288,100	7594	260,442
1200	58	8000	332,500	464	19,285
2200	17	12,000	512,000	204	8,704
				$11,825	$418,316

Value of Equipment on Purchase-Leaseback.	-40,000
Value of Honeywell-Owned Equipment on Lease to Customers.	$378,316

Monthly Rental from Honeywell-Owned Equipment ($1000's).....$10,694

current growth rate and the size of its potential market, we expect Honeywell's international computer sales operation to equal the domestic activity in annual revenue by 1970. Profitable operation is expected to begin by late 1968.

Prospects for profits.

Honeywell's Computer Group domestic activity became profitable during 1966. This was made possible by (1) establishing a broad base of leasing revenue from current customers, and (2) setting up, with financial institutions, purchase-leaseback arrangements for computer systems on which customers have signed five-year contracts. Table 3 provides an analysis of the sources of the $188 million revenue that EDP I&MR estimates Honeywell's Computer Group received during 1966.

Honeywell started pushing longer term leases in 1966. Now it reports that some 75% of its 200 series equipment leased during the past year by commercial customers is covered by three- or five-year contracts. When financial conditions have warranted it, Honeywell has sold some of the five-year leases to financial institutions. The customer isn't affected by these transactions, but the result to Honeywell is similar to that of a cash sale: Honeywell immediately receives nearly the full purchase price of the machine. During 1966, some $40 million of 200 series systems were involved in such purchase-leaseback transactions. These transactions added some $8 million -- or an estimated 54¢ per share -- to the corporation's earnings for 1966. Without these purchase-leaseback deals, the revenue from the machines involved would still have yield about 8¢ to 10¢ per share to earnings.

And as indicated in Table 4, Honeywell enters 1967 with some $418 million of computer equipment on lease to customers. The majority of these leases are three- to five-year contracts, so they represent a committed flow of revenues to the company. Table 4 also indicates that the monthly revenue generated from Honeywell-owned leased equipment installed at the beginning of '67 is $10.7 million a month, or potentially $128 million for the full year.

Table 4 also provides evidence that Honeywell's Computer Group is in a very favorable position from which to reach its profit objectives during the coming year. It owns some $378 million of computer equipment which it has on lease to customers. Of this, we estimate that some 25% or $95 million is covered by five-year lease contracts and therefore a candidate for purchase-leaseback transactions at the discretion of the company. Based on the way the company handled this type of financial deal in 1966, this equipment potentially could add over $18.6 million to Honeywell's net income in 1967, equal to $1.27 per share. Of course, only a limited amount of this equipment is actually likely to be involved in purchase-leaseback transactions during the coming year.

Our estimate is that Honeywell will ship some $360 million of new computer equipment during 1967. Sale and lease revenues from these shipments should amount to approximately $80 million. Add to this $128 million in revenue from equipment already on lease and an estimated $60 million from the sale of leased equipment, supplies, and services and you come up with $268 million in revenues for Honeywell's Computer Group during 1967. This amount, which doesn't include any revenue from purchase-leaseback arrangements, would be an increase of nearly 45% over our estimate of the Computer Group's 1966 revenue...and represents nearly 26% of the corporation's total expected business during 1967. Indeed, Honeywell insiders expect that by 1970 the Computer Group will contribute nearly one-half of Honeywell Inc.'s total sales, and hopefully an even greater share of its profits.

Since computer revenues have turned the profit corner in the domestic area during '66, and should do this in the international area by late '68, Honeywell is in

STOCK MARKET REPORT ON SELECTED EDP FIRMS

December 9 - 23, 1966

NEW YORK STOCK EXCHANGE	1966 High	1966 Low	2 weeks Sales in 100's	2 weeks High	2 weeks Low	Last	2 weeks Net Change	2 weeks % Change
Addressograph-Multigraph	77 3/8	50 1/2	1510	57 3/8	53 3/4	55 1/2	+1	+1.83
American R & D	44 3/4	20 1/4	332	41 7/8	37 3/4	40 5/8	+1	+2.52
Ampex Corp.	27 5/8	17	3736	26 1/2	24 7/8	25 1/4	+1/2	+2.02
Burroughs	93 3/8	49 1/4	2116	93 3/8	85 5/8	89 1/4	+2 1/2	+2.88
Collins Radio	85 3/8	37 5/8	1643	63 7/8	57 1/8	62 1/2	+4	+6.84
Control Data	39 1/4	23 5/8	2585	35 1/8	31 3/4	34 3/4	+7/8	+2.58
Electronic Assoc.	27 1/8	12 1/4	625	19	17 1/8	17 1/4	-1 3/8	-7.38
General Electric	120	80	2737	99	86	86 3/8	-11 1/8	-11.41
Honeywell	96	53 1/2	1748	67	60	65 1/4	+4 3/8	+7.19
IBM	386	289 1/2	779	386	366	367 1/2	-9	-2.39
Inter. Tel & Tel	79 3/8	58 1/8	1199	78 7/8	75	75	-1/4	-0.33
Litton	86 1/2	56 5/8	1289	82 7/8	77 3/4	79	-2	-2.47
Nat Cash Register	91 1/2	59	999	72 1/8	68 5/8	71	+7/8	+1.27
RCA	62 1/4	36 3/4	2956	48 1/2	43 1/4	43 1/4	-4 3/4	-9.90
Raytheon	57 5/8	36	3964	57 5/8	53 1/4	54 1/2	+1 1/2	+2.83
Scientific Data	81 1/8	41 1/4	1534	68 1/8	55 1/8	66 7/8	+11 3/8	+20.49
SCM	91 7/8	42 1/8	3865	68 1/2	63	64 7/8	+2	+3.18
Singer	64 3/4	39 3/8	2754	48 1/8	43 1/8	48 1/8	+3 1/2	+7.84
Sperry Rand	33 5/8	17 1/8	9924	30 1/4	28 1/2	29 5/8	+1 1/8	+3.95
Teledyne	133	50 3/8	1887	93 1/4	83 1/2	90 3/4	+8 1/2	+10.33
NYSE COMPUTER STOCK AVERAGE							+0.78	+2.09
AMERICAN STOCK EXCHANGE								
ANelex	28	7 3/8	659	15 1/2	11 7/8	13	+1/4	+1.96
Audio Devices, Inc.	41 1/4	17	672	26 1/2	21	23	+2	+9.52
Bunker-Ramo	10 1/2	4 5/8	1288	8 3/8	7 3/8	8	+3/8	+4.92
Cal Comp	34 3/4	13 1/4	573	34 3/4	31 1/4	32 3/8	+3/4	+2.37
Clary	8	3 5/8	256	4 3/4	3 7/8	4 1/4	--	--
Computer Application	26 1/4	8	690	16	11	15 7/8	+4 1/8	+35.12
Computer Science	37 1/4	15 1/4	447	23 7/8	21 7/8	22 3/4	+3/4	+2.93
Digital Equipment	35 1/2	27 1/4	1651	34 1/8	28 1/4	31 7/8	+1 1/4	+4.90
Leasco Data Proc Equip Corp	40 1/2	18 1/2	1196	38 3/4	31 1/4	33 5/8	+3	+9.80
Levin-Townsend Comp Corp	26 7/8	8 1/2	364	12 3/4	8 3/4	12 3/8	+2 1/4	+22.22
Milgo Electronics	8 7/8	4	440	6 1/2	5	6 1/8	+3/8	+6.52
Planning Research	36 1/2	12 7/8	159	21 3/4	18 5/8	19 7/8	-7/8	-4.22
Potter Instrument	26 3/8	9 1/8	316	14	11 3/4	12 3/8	+1/2	+4.21
AMEX COMPUTER STOCK AVERAGE							+1.13	+7.71

OVER-THE-COUNTER	1966 High Bid	1966 Low Bid	Bid	Asked	2 weeks ago Bid
Applied Data Research, Inc.	6 3/4	2 1/4	4 1/4	4 3/4	2 1/2
Aries Corp.					8 5/8
Automatic Data Processing	28 1/2	21 3/4	25 3/4	26 1/2	27 3/4
Bolt, Beranek & Newman, Inc.	16	7 3/8	8 3/8	8 7/8	7 3/4
C-E-I-R	15 1/4	5 3/4	6 1/2	6 3/4	6 3/8
Computer Usage	24 1/2	16 3/4	22	23	21 3/4
Data Products	4	2 1/4	2 5/8	2 7/8	2 3/4
Digitronics	12 3/4	4 3/4	6 1/2	6 7/8	6 3/4
Documentation, Inc.	8 1/2	3 3/8	4 3/8	4 3/4	3 3/8
DPA, Inc.	19 7/8	3 5/8	4 3/8	4 3/4	5 1/4
Electronic Memories	26	10	11 3/4	12 1/8	11 5/8
Fabri-Tek	26	5 3/4	6 1/4	6 5/8	6 1/8
Informatics, Inc.	8 1/2	7 1/2	7 3/4	8 1/4	7 3/4
Management Assistance	45 3/4	11 1/4	14 7/8	15 1/4	13
Memorex	72 1/4	31 1/2	68 1/4	69 1/4	71
Mohawk Data Sciences	46	19	32 7/8	33 1/4	30 3/4
Randolph Computer Corp	21 3/4	10	17	18	11
Recognition Equipment, Inc.	72	33	57	59	41 1/2
Systems Engineering Labs			8 1/4	8 5/8	--
University Computing Co.			21	21 1/2	18 1/4

a very good position, at last, to begin to reap handsome returns from the substantial and steadfast investments it made in its computer business during the ten uncertain years from 1956 to 1965. On the basis of (1) continued acceptance of its equipment by current customers, (2) its current order backlog (over $340 million in new orders were booked during 1966), and (3) its technical and market position, we look for Honeywell to maintain its place as number two in computer industry shipments during the next three years. Also, by the end of the decade, Honeywell's Computer Group stands an excellent chance of gaining firm hold of the number two position in the industry, both in terms of the total value of computer equipment installed and total share of the computer market.

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E|D|P
INDUSTRY AND MARKET REPORT

A SEMI-MONTHLY NEWSLETTER FOR EXECUTIVES IN THE ELECTRONIC DATA PROCESSING INDUSTRY, AND THE FINANCIAL COMMUNITY.

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AIR FORCE TESTS COMPUTERS AS IT PREPARES TO AWARD $100+ MILLION CONTRACT; ONE RESULT FOR COMPUTER INDUSTRY MAY BE IMPORTANT STEP TOWARD STANDARDIZATION

The Air Force currently is evaluating computers for the largest and most important contract award the EDP industry has been offered to date. The contract is for Phase II of the USAF Base Level Data Automation Standardization Program, and the contract requirements establish several precedents for government computer buying:

- The order itself -- for 100 to 160 computer systems that will have a total value well over $100 million -- will go to a single manufacturer. Thus it will supply the contract winner a steady source of business for several years.
- The Request for Proposal for these systems contains a thorough and well-thought-out system description. It virtually sets an industry standard for practical, real-time computer systems for business management applications. . .such systems offer a considerable future market potential.
- The RFP also requires that companies bid modular systems -- ones that can be enlarged through a family of compatible computers. This, in essence, puts a stamp of approval on the "compatible family" approach to computer product lines.
- Other government customers, as well as many commercial customers, are likely to use the Air Force standards when they go computer shopping. All companies that submitted bids will therefore be in a better position to compete for such future business.

The Air Force has clamped a strict lid of secrecy on the project while competitive bids are being evaluated. During January, the systems are undergoing live benchmark test demonstrations and about the end of March the winning manufacturer will be announced. No companies are talking openly about the contract, but EDP I&MR understands that five computer manufacturers -- Burroughs, Honeywell, IBM, RCA, and Univac -- have submitted complete proposals to the Air Force.

Pricing is naturally an important aspect of the proposals, and one about which no one will talk. Most companies will discount the list or long-term lease prices, hoping to have the lowest figure yet still be able to make a profit. In the case of IBM, however, the situation is more involved. IBM has over $800 million of its computers in use by the Federal Government (not including those in military or classified operations). The GSA's "most favored customer" contract term requires government vendors to offer the government retroactively the best price offered any customer during the contract year. Thus, if IBM bids 360 equipment at lower than

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list price, it could have to rebate millions of dollars to other government agencies who have bought 360's at list.

The system requirements

The equipment will be used at 14 major commands and over 100 bases and selected facilities world-wide. Since the workload requirements at different bases will vary in size, the Air Force has specified four different workload levels for which systems must be proposed. More important, the Air Force has required complete compatibility. In the RFP, it says:

> "Different models or configurations of equipment proposed must be composed of components selected from an integrated group or series of off-the-shelf electronic data processing equipment systems generally referred to as 'families, systems, or series of program-compatible processors.'" (Emphasis ours.)

In addition, the RFP requires that the same program must run on all configurations, "subject only to capacity limitations and the number of I/O components available for use." Thus, manufacturers without compatible computer lines were virtually eliminated from the bidding.

The systems will have to handle three types of processing: real-time and concurrent batch for eight hours a day, and nonconcurrent batch outside of the real-time period. They will handle systems for such functions as accounting and finance, civil engineering, maintenance engineering, military and civilian personnel, and transportation.

In outlining the requirements for the computer systems, the Air Force did two important things in addition to laying out strict system configurations: 1) It required that all equipment bid -- including that which would satisfy the requirement for 100% expansion -- be formally announced by the companies; and 2) It called for a test in January of the equipment configuration proposed for the highest workload level outlined in the RFP. The Air Force also requires operational COBOL, thus striking a blow at IBM's efforts to promote PL/1 as a universal language.

The effect of the Air Force's requirements is to set standards for a practical, real-time system that will operate now. Rather than call for the many exotic techniques being worked on experimentally and not to have widespread use for years, the Air Force was realistic. For example, the system has 25 seconds in which to answer inquiries from remote terminals, and all terminals will have equal priority. This may sound like a step backward from what is being accomplished by the large experimental time-sharing networks. But they are part of a system configuration that vendors can meet now. Also, the Air Force feels that the requested equipment -- because of its high degree of modularity -- will satisfy the base level data processing requirements for "at least a six-year period."

Outlook for manufacturers

Commercial computer manufacturers, on the other hand, stand to be in a good position as a result of having demonstrated these capabilities to the Air Force. Even though most of them probably spent well over $1 million in preparing a proposal, the marketing potential for similar systems is high. The AF RFP asks for truly mainstream business-oriented capabilities in currently available equipment. Computer vendors that are now geared up to meet these system specs can respond

more promptly and probably more competitively to other customer prospects who'll model their systems along the AF's guidelines.

The Phase II program is the successor to a Phase I automation program, in which nearly 150 B263 card computers, and some IBM 1401's, are currently used at Air Force bases. Thus, Burroughs has the most important financial stake in this contract because over $25 million of its own computers are being replaced by new systems. Correspondingly, Burroughs has an advantage because its sales and service personnel have been closely involved with the plans, policies, and people of the AF's base automation program over the past three years.

Honeywell also has an inside position. It already has eight H800/200 systems handling the AF's Major Air Command Data Automation Standardization Program. If this program were expanded, existing H800 software could be used on the H8200, the largest machine in the 200 series.

Some of the bidding firms, obviously, had to make equipment modifications to meet the RFP requirements; some software development programs had to be accelerated or rescheduled. None will discuss these changes in terms of the contract, but there are some hints. Here is our analysis of what basic equipment each firm will bid and what its experience with the equipment has been.

- Burroughs -- likely bid its 2500 and 3500 machines. Deliveries are scheduled to start in January and May respectively, so the machines should be ready to be demonstrated for the Air Force. Software will of necessity be new and not field tested. There is not yet a larger program-compatible model in the family.
- Honeywell -- probably bid the 1200 and 2200 from its 200 series. It recently announced that it was adding mass information storage, data communications, multiprogramming, and necessary related software for these machines, and these were almost certainly designed to meet Air Force requirements. About 90 of the two models are installed, and basic software is reported in good shape. Multiprogramming software will be largely without field testing.
- IBM -- certain to bid models 30 and 40 from System 360. Naturally it has most operational experience with its family of machines, with 1450 and 2750 installations, respectively. In the fall, it added time-sharing capabilities to models 30, 40, and 50, likely in anticipation of the Air Force contract. Reportedly, however, it barely got its COBOL compiler operating in time.
- RCA -- with its Spectra 70 models 35 and 45, offers the family approach. Just over 40 of these machines are installed, and the first went on the air about a year ago. Software reported working adequately. The company during January announced a Data Gathering System that allows modular input stations, which could fit AF requirements.
- Univac -- hasn't scheduled deliveries of its 9000 series machines until the last half of 1967, so it probably can't meet Air Force schedules with these. We understand it will bid its 1050, which has been in customer hands three years, and an upgraded version -- with plated wire memory -- which it will call the 1055. This could be called a family, since the company has several models of the 1050 out, but it is an older machine, with no announced larger model to upgrade to.

The fact that some companies will be bidding new software or hardware should not weigh too heavily against them. The Air Force has made its requirements so exact that if a system passes the live test demonstrations -- and can be delivered on schedule -- it likely will be in the running. It appears to us that once a company's proposal meets requirements, and its machine passes the live test, price (as we've mentioned earlier) will be the principal consideration.

Conclusion

The contract obviously will be a plum for any computer manufacturer, and except for IBM it will supply a significant portion of the winner's business for a full year starting in spring, '68. Deliveries peak to about 14 a month starting in mid-1968. Also, as the Air Force evaluates the test systems during 1967, other government agencies will certainly start looking at the operation. Similar system criteria will obviously be used by many groups, and computer manufacturers that didn't bid on the Air Force contract will eventually have to ante up to meet the requirements.

It looks as though the much-discussed need for standardization has moved a giant step closer -- not by industry cooperation, as has been proposed -- but through competition for an order so large it steers system development into the framework outlined by the customer. Manufacturers claim they don't want government regulation. But, as this case shows, they want government business and will be moved toward standardization in an attempt to get it.

GE PRUNES ITS COMPUTER PRODUCT LINE AND NARROWS ITS MARKETING GOALS AS MANAGEMENT STRIVES TO TRIM LOSSES ON ITS COMPUTER BUSINESS

General Electric's top management, impatient with mounting losses in its computer operations and well-publicized performance difficulties with its large-scale 600 computer series, has directed that its Information Systems Division do some "entrenching" and "slowing its expansion pace". The effect has been the canning of two recently announced computer models, layoffs of nearly a thousand employees worldwide, and a restriction of the marketing effort on its large-scale computers.

What seems to be happening is that "up-thru-the-ranks" GE management is beginning to fully appreciate that selling computer hardware is quite different from selling electric power turbines or aircraft engines. Besides the metal that the vendor deposits at the customer's site, there needs to be a carefully preplanned array of systems analysis, programming and training services provided for the customer. In addition, the hardware must come with competent, thoroughly tested software to control the functioning of the system. In fact, upwards of 50% of the value that the customer buys when he acquires a computer system is represented by support and service factors other than the hardware itself.

GE's recent appointment of J. Stanford Smith as vice president and general manager of its Information Systems Division is partially in response to this realization. Smith has been GE's top marketing executive, functioning as VP for marketing and public relations services for the firm's 200,000 products.

Smith faces a considerable challenge. Worldwide, GE is thought to have lost close to $400 million in its computer business to date. Probably the most biting loss has been the $50 million dropped in the first eighteen months of operation of Bull/GE since the French-U.S. venture was formed in July, 1964. To limit further losses, GE has pruned the product line of Bull/GE by dropping the

Gamma 140 and 145, two medium-scale computers. Neither unit was installed yet although about 15 systems were on order. GE is consolidating its software and systems support behind its 400 series, and promoting it as the medium-scale computer to service the European market. This saves GE the expense of supporting another product line which, although economical to manufacture, would require expensive business-oriented software systems and application packages. Bull/GE will continue to market the Gamma 55 and the Gamma 10, two small computers. Also, R&D work is continuing on a line of integrated circuit computers to be introduced at the end of the decade. However the product cutbacks resulted in the layoff of several hundred employees in France, which raised political and diplomatic tempers in a country somewhat oversensitive about U.S. economic influence.

The performance difficulties of the large-scale 600 series are "nearly licked", GE reports, but for the present the company is confining the marketing of the 600 to customers with scientific/engineering applications where the equipment "meets customer performance requirements". The 600 has been virtually withdrawn from all markets outside of the United States. A 615 order was turned back in Australia. Two 625's in France...French Electricity Board and Weather Bureau... were ordered but the delivery date was postponed indefinitely. Between 25 and 30 600's are installed in the U.S....many in GE's own plants. "Most are accepted" the company reports. Recent installations have received favorable reactions from customers indicating that things are settling down. The market future for the 600 received a considerable boost when its rival for time-sharing applications, IBM 360/67, was recently suspended by IBM as an actively marketed computer. The time-sharing software for the model 67 was postponed until fall, 1968...and then delivery is associated with a lot of "if's". The model 65 is offered as the computer of comparable processing capability sans time-sharing usage. This puts a considerable crimp into the plans of users who want to get time-shared computer service set-up by mid-68, and the fallout should provide some attractive business for GE. Control Data, Univac, and SDS also stand to benefit from the woes of IBM's time-sharing software.

GE's expense trimming measures have resulted in the layoff of close to 500 people at the firm's Phoenix computer manufacturing plant. GE's Computer Research Laboratory in Sunnyvale, Calif. is also being phased out. The company is seeking to reduce its investment in the development and manufacture of new peripherals by buying sensible ones from outside. GE is expected to add Control Data's disc pack drive mass storage unit to its product line in the near future. Also, Control Data may get the order for large disc files.

GE's position in the computer field is in no way threatened by its recent problems, and its top management seem convinced that GE has a profitable future in the computer business...given a carefully controlled maturing of its software and service capabilities. GE has a considerable reservoir of strength in process control experience with computers and with manufacturing automation systems. When it successfully blends this asset with computer skills in management information systems, it will have just reason to expect a respectable share of the computer market of the 1970's.

NEWS BYTES

Burroughs has picked up two impressive new computer orders. The Trust Bank of So. Africa Ltd. Placed an order, valued at $6.5 million, for six B3500's for an advanced on-line banking system. Univ. of Wisconsin signed up for the purchase of a B8500, only the second order for this super-scale system. The system, when installed in February, '68, will be used as a computer "utility" at the Madison campus ...connected to over 700 locations around the state. The initial order is valued at $4.5 million but could scale up to $14 million when the system is fully implemented.

MONTHLY COMPUTER CENSUS

The number of electronic digital computers installed or in production at any one time has been increasing at a bewildering pace in the past several years. New vendors have come into the market, and familiar machines have gone out of production. Some machines have been received with open arms by users -- others have been given the cold shoulder.

To aid readers of the EDP I&MR in keeping with this mushrooming activity, we compile and publish this monthly report on the number of general purpose electronic computers made by American-based companies which are installed or on order as of the preceding month. These figures included installations and orders outside the United States. We update this computer census monthly, so that it will serve as a "box score" of progress in following the growth of the American computer industry, and of the computing power it builds.

In general, manufacturers in the computer field do not officially release installation and on order figures. The figures in this table are developed through a continuing market survey conducted by our research staff. This market research program develops a documented data file on over 80% of the computer installations in the United States. A similar program is conducted for overseas installations.

Comments on this census from informed readers will be welcomed.

AS OF DECEMBER 10, 1966

NAME OF MANUFACTURER	NAME OF COMPUTER	SOLID STATE?	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS	NUMBER OF UNFILLED ORDERS
Advanced Scientific Instruments	ASI 210	Y	$3850	4/62	25	0
	ASI 2100	Y	$4200	12/63	7	0
	ADVANCE 6020	Y	$4400	4/65	13	17
	ADVANCE 6040	Y	$5600	7/65	7	7
	ADVANCE 6050	Y	$9000	2/66	6	6
	ADVANCE 6070	Y	$15,000	10/65	5	6
	ADVANCE 6130	Y	$1000	11/66	2	18
Autonetics	RECOMP II	Y	$2495	11/58	36	X
	RECOMP III	Y	$1495	6/61	7	X
Bunker-Ramo Corp	BR-130	Y	$2000	10/61	160	2
	BR-133	Y	$2400	5/64	27	42
	BR-230	Y	$2680	8/63	15	X
	BR-300	Y	$3000	3/59	35	X
	BR-330	Y	$4000	12/60	30	X
	BR-340	Y	$7000	12/63	20	X
Burroughs	205	N	$4600	1/54	42	X
	220	N	$14,000	10/58	34	X
	E101-103	N	$875	1/56	125	X
	B100	Y	$2800	8/64	168	14
	B250	Y	$4200	11/61	84	1
	B260	Y	$3750	11/62	232	2
	B270	Y	$7000	7/62	164	4
	B280	Y	$6500	7/62	128	5
	B300	Y	$10,000	7/65	130	81
	B2500	Y	$5000	1/67	0	42
	B3500	Y	$14,000	5/67	0	30
	B5500	Y	$22,000	3/63	60	12
	B6500	Y	$33,000	2/68	0	10
	B8500	Y	$200,000	2/67	0	1
Control Data Corporation	G-15	N	$1600	7/55	310	X
	G-20	Y	$15,500	4/61	23	X
	LGP-21	Y	$725	12/62	118	X
	LGP-30	semi	$1300	9/56	122	X
	RPC-4000	Y	$1875	1/61	55	X
	160*/160A/160G	Y	$2100/$4000/$12,000	5/60;7/61;3/64	460	3
	924/924A	Y	$11,000	8/61	26	X
	1604/1604A	Y	$45,000	1/60	58	X
	1700	Y	$4000	5/66	35	125
	3100	Y	$11,000	12/64	105	38
	3200	Y	$14,000	5/64	86	X
	3300	Y	$15,000	9/65	60	50
	3400	Y	$25,000	11/64	19	X
	3500	Y	$30,000	9/67	0	6
	3600	Y	$58,000	6/63	50	X
	3800	Y	$60,000	2/66	16	14
	6400	Y	$50,000	5/66	12	18
	6600	Y	$85,000	8/64	21	16
	6800	Y	$130,000	4/67	0	4
Data Machines, Inc.	620	Y	$900	11/65	35	25
Digital Equipment Corp.	PDP-1	Y	$3400	11/60	60	X
	PDP-4	Y	$1700	8/62	57	X
	PDP-5	Y	$900	9/63	115	1
	PDP-6	Y	$10,000	10/64	23	2
	PDP-7	Y	$1300	11/64	105	35
	PDP-8;8/S	Y	$525;$300	4/65	550	560
	PDP-9	Y	$1000	12/66	0	60
	PDP-10	Y	$9000	7/67	0	2
El-tronics, Inc.	ALWAC IIIE	N	$1820	2/54	15	X
Electronic Associates, Inc.	8400	Y	$12,000	6/65	12	8
General Electric	115	Y	$1800	12/65	240	560
	205	Y	$2900	6/64	44	X
	210	Y	$16,000	7/59	49	X
	215	Y	$6000	9/63	54	X
	225	Y	$8000	4/61	205	X
	235	Y	$10,900	4/64	69	2
	415	Y	$9600	5/64	200	55
	425	Y	$18,000	6/64	84	44
	435	Y	$25,000	9/65	30	18
	625	Y	$50,000	4/65	22	18
	635	Y	$56,000	5/65	19	22
	645	Y	$90,000	7/66	2	10
Honeywell	DDP-24	Y	$2500	5/63	85	3
	DDP-116	Y	$900	4/65	138	35
	DDP-124	Y	$2050	3/66	24	36
	DDP-224	Y	$3300	3/65	46	10
	DDP-516	Y	$700	2/67	0	40
	H-120	Y	$3900	1/66	330	290
	H-200	Y	$8400	3/64	960	140
	H-400	Y	$8500	12/61	115	X
	H-800	Y	$28,000	12/60	90	2
	H-1200	Y	$8000	2/66	50	95
	H-1400	Y	$14,000	1/64	12	1

NAME OF MANUFACTURER	NAME OF COMPUTER	SOLID STATE?	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS	NUMBER OF UNFILLED ORDERS
Honeywell (cont'd)	H-1800	Y	$42,000	1/64	20	1
	H-2200	Y	$12,000	1/66	18	58
	H-4200	Y	$20,500	3/67	0	6
	H-8200	Y	$35,000	3/68	0	2
	DATAmatic 1000	N	$40,000	12/57	2	X
IBM	305	N	$3600	12/57	140	X
	360/20	Y	$2000	12/65	1200	6400
	360/30	Y	$7500	5/65	2500	4400
	360/40	Y	$15,000	4/65	1350	1500
	360/44	Y	$10,000	7/66	20	150
	360/50	Y	$26,000	8/65	140	600
	360/62	Y	$55,000	11/65	1	X
	360/65	Y	$50,000	11/65	28	215
	360/67	Y	$75,000	10/66	6	66
	360/75	Y	$78,000	2/66	16	32
	360/90 Series	Y	$140,000	6/67	0	10
	650	N	$4800	11/54	170	X
	1130	Y	$1200	11/65	700	3800
	1401	Y	$6600	9/60	7680	X
	1401-G	Y	$2300	5/64	1620	X
	1410	Y	$14,200	11/61	805	65
	1440	Y	$4800	4/63	3350	120
	1460	Y	$11,500	10/63	1780	X
	1620 I, II	Y	$4000	9/60	1670	20
	1800	Y	$7600	1/66	100	320
	701	N	$5000	4/53	1	X
	7010	Y	$22,600	10/63	214	6
	702	N	$6900	2/55	6	X
	7030	Y	$160,000	5/61	6	X
	704	N	$32,000	12/55	32	X
	7040	Y	$22,000	6/63	120	4
	7044	Y	$32,000	6/63	125	5
	705	N	$38,000	11/55	52	X
	7070, 2, 4	Y	$27,000	3/60	322	X
	7080	Y	$55,000	8/61	85	X
	709	N	$40,000	8/58	9	X
	2090	Y	$63,500	11/59	45	X
	2094	Y	$72,500	9/62	117	2
	7094 II	Y	$78,500	4/64	128	4
National Cash Register Co.	NCR - 304	Y	$14,000	1/60	25	X
	NCR - 310	Y	$2500	5/61	10	X
	NCR - 315	Y	$8500	5/62	380	150
	NCR - 315-RMC	Y	$12,000	9/65	26	45
	NCR - 390	Y	$1850	5/61	720	30
	NCR - 500	Y	$1500	10/65	810	810
Philco	1000	Y	$7010	6/63	16	X
	2000-210, 211	Y	$40,000	10/58	16	X
	2000-212	Y	$52,000	1/63	12	X
Radio Corporation of America	RCA 301	Y	$7000	2/61	644	2
	RCA 3301	Y	$17,000	7/64	68	6
	RCA 501	Y	$14,000	6/59	96	X
	RCA 601	Y	$35,000	11/62	5	X
	Spectra 70/15	Y	$4100	9/65	75	110
	Spectra 70/25	Y	$6700	9/65	43	60
	Spectra 70/35	Y	$10,400	7/66	14	94
	Spectra 70/45	Y	$17,400	11/65	22	98
	Spectra 70/55	Y	$40,500	12/66	0	12
Raytheon	250	Y	$1200	12/60	175	X
	440	Y	$3500	3/64	16	3
	520	Y	$3200	10/65	20	6
Scientific Control Corporation	650	Y	$500	5/66	3	7
	655	Y	$1800	10/66	0	2
	660	Y	$2000	10/65	5	3
	670	Y	$2600	5/66	1	2
Scientific Data Systems Inc.	SDS-92	Y	$1500	4/65	70	28
	SDS-910	Y	$2000	8/62	188	6
	SDS-920	Y	$2900	9/62	138	10
	SDS-925	Y	$3000	12/64	30	10
	SDS-930	Y	$3400	6/64	135	15
	SDS-940	Y	$10,000	4/66	8	10
	SDS-9300	Y	$7000	11/64	33	7
	Sigma 2	Y	$1000	12/66	0	180
	Sigma 7	Y	$12,000	12/66	0	25
Systems Engineering Labs	SEL-810/810A	Y	$1000	9/65	28	8
	SEL-840/840A	Y	$1400	11/65	3	6
UNIVAC	I & II	N	$25,000	3/51 & 11/57	25	X
	III	Y	$20,000	8/62	76	X
	File Computers	N	$15,000	8/56	16	X
	Solid-State 80 I, II 90 I, II & Step	Y	$8000	8/58	240	X
	418	Y	$11,000	6/63	98	38
	490 Series	Y	$35,000	12/61	112	54
	1004	Y	$1900	2/63	3200	50
	1005	Y	$2400	4/66	460	240
	1050	Y	$8000	9/63	295	35
	1100-1106 Series	N	$35,000	12/50	10	X
	1107	Y	$55,000	10/62	29	X
	1108	Y	$65,000	9/65	29	60
	9200	Y	$1500	6/67	0	600
	9300	Y	$3400	6/67	0	200
	LARC	Y	$135,000	5/60	2	X
					39,983	23,456

X = no longer in production.

* To avoid double counting, note that the Control Data 160 serves as the central processor of the NCR 310. Also, customers ordering a new computer model intended to replace a computer model in the same product line may continue to use their current peripheral equipment, which can account for 30-70% of the value of the total computer system.

STOCK MARKET REPORT ON SELECTED EDP FIRMS

December 23, 1966 - January 6, 1967

NEW YORK STOCK EXCHANGE	1966 High	1966 Low	2 weeks Sales in 100's	2 weeks High	2 weeks Low	Last	2 weeks Net Change	2 weeks % Change
Addressograph-Multigraph	77 3/8	49 1/8	933	55	49 1/8	53 5/8	-1 7/8	-3.38
American R & D	44 3/4	20 1/4	152	41 1/2	37 3/4	39 5/8	-1	-2.46
Ampex Corp.	27 5/8	17	1520	25 3/8	22 3/4	24	-1 1/4	-4.95
Burroughs	93 3/8	49 1/4	1693	91	80 7/8	89 1/2	+1/4	+0.28
Collins Radio	85 3/8	37 5/8	1525	62 3/4	53	57 5/8	-4 7/8	-7.80
Control Data	39 1/4	23 5/8	6140	39	32	38 1/4	+3 1/2	+10.07
Electronic Assoc.	27 1/8	12 1/4	631	19	16 1/2	18 7/8	+1 5/8	+9.42
General Electric	120	80	2217	91 3/8	84 1/4	88	+1 5/8	+1.85
Honeywell	96	53 1/2	1142	70	63 1/4	70	+4 3/4	+7.27
IBM	386	289 1/2	597	378 1/2	362 1/2	378	+10 1/?	+0.29
Inter. Tel & Tel	79 3/8	58 1/8	874	76 1/2	72 1/2	76 3/8	+1 3/?	+1.83
Litton	86 1/2	56 5/8	1135	83 3/4	78 5/8	81	+2	+2.53
Nat Cash Register	91 1/2	59	487	71 1/8	67 1/8	70 1/4	-3/4	-1.06
RCA	62 1/2	36 3/4	2347	45 3/8	42 1/2	45 1/4	+2	+4.62
Raytheon	57 3/8	36	2181	55 1/2	49	52 3/8	-1 7/8	-3.46
Scientific Data	81 1/8	41 1/4	1751	76	63	75 7/8	+9	+11.34
SCM	91 7/8	42 1/8	4037	64	53 1/4	56 7/8	-8	-12.33
Singer	64 3/4	39 3/8	1355	50 7/8	45	50 1/2	+2 3/8	+4.93
Sperry Rand	33 5/8	17 1/8	6062	30 5/8	28 1/8	28 3/8	-1 1/4	-4.22
Teledyne	133	50 3/8	1278	91 1/4	80 1/8	87 3/8	-3 3/8	-3.72
NYSE COMPUTER STOCK AVERAGE							+0.74	+0.55
AMERICAN STOCK EXCHANGE								
ANelex	28	7 3/8	348	14 3/8	10 5/8	13 3/4	+3/4	+5.77
Audio Devices, Inc.	41 1/4	17	333	24 3/8	21 3/4	22 1/4	-3/4	-3.26
Bunker-Ramo	10 1/2	4 5/8	658	8 1/4	7 5/8	7 7/8	-1/8	-1.56
Cal Comp	34 3/4	13 1/4	318	33 1/8	29 1/8	32 7/8	+1/2	+1.54
Clary	8	3 5/8	224	4 5/8	4	4 1/2	+1/4	+5.88
Computer Application	26 1/4	8	343	16 1/2	14 1/8	15 1/2	-3/8	-2.36
Computer Science	37 1/4	15 1/4	586	23 3/8	20 3/4	22 7/8	+1/8	+0.55
Digital Equipment	35 1/2	27 1/4	387	32 1/8	29 3/8	30 1/4	-1 5/8	-5.10
Leasco Data Proc Equip Corp	40 1/2	18 1/2	516	36 7/8	31 1/4	36 5/8	+3	+8.92
Levin-Townsend Comp Corp	26 7/8	8 1/2	217	12 3/8	11	11 3/4	-5/8	-5.05
Milgo Electronics	8 7/8	4	104	6 1/8	5 1/8	5 1/2	-5/8	-10.20
Planning Research	36 1/2	12 7/8	241	22 5/8	18 5/8	22	+2 1/8	+10.69
Potter Instrument	26 3/8	9 1/8	260	14 1/2	12 3/8	13	+5/8	+5.05
AMEX COMPUTER STOCK AVERAGE							+0.25	+0.84

OVER-THE-COUNTER	1966 High Bid	1966 Low Bid	Jan. 6 Bid	Jan. 6 Asked	2 weeks ago Bid
Applied Data Research, Inc.	6 3/4	2 1/4	4 1/2	5	4 1/4
Aries Corp.	8 1/2	3	8 3/4	9 1/4	8 3/4
Automatic Data Processing	28 1/2	21 3/4	24 1/2	25 3/8	25 3/4
Bolt, Beranek & Newman, Inc.	16	7 3/8	9 3/4	10 1/4	8 3/8
C-E-I-R	15 1/4	5 3/4	6 7/8	7 1/8	6 1/2
Computer Usage	24 1/2	16 3/4	21	22	22
Data Products	4	2 1/4	2 1/2	2 3/4	2 5/8
Digitronics	12 3/4	4 3/4	6 1/8	6 1/2	6 1/2
Documentation, Inc.	8 1/2	3 3/8	4 3/8	4 3/4	4 3/8
DPA, Inc.	19 7/8	3 5/8	4 1/2	4 7/8	4 3/8
Electronic Memories	26	10	13	13 1/2	11 3/4
Fabri-Tek	26	5 3/4	6 7/8	7 3/4	6 1/4
Informatics, Inc.	8 1/2	7 1/2	7 5/8	8 1/8	7 3/4
Management Assistance	45 3/4	11 1/4	15 1/8	15 1/2	14 7/8
Memorex	72 1/4	31 1/2	65 3/4	66 3/4	68 1/4
Mohawk Data Sciences	46	19	32	32 1/2	32 7/8
Randolph Computer Corp	21 3/4	10	15 3/4	16 1/4	17
Recognition Equipment, Inc.	72	33	53	55	57
Systems Engineering Labs			8 5/8	9 1/8	8 1/4
University Computing Co.			22 7/8	23 3/8	21

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INDUSTRY AND MARKET REPORT

A SEMI-MONTHLY NEWSLETTER FOR EXECUTIVES IN THE ELECTRONIC DATA PROCESSING INDUSTRY, AND THE FINANCIAL COMMUNITY.

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IBM ACHIEVES 18.9% INCREASE IN REVENUE, 10.3% INCREASE IN NET EARNINGS, FOR 1966; FUTURE PROSPECTS LOOK VERY FAVORABLE, BARRING STIFF ANTITRUST ACTION

IBM's stockholders will find that the company's Annual Report, just issued, contains a familiar but happy story: record sales and earnings for the past year. But it also contains some enlightening statistics on the changing character of the company and of the market it serves. For example:

- Although IBM had an 18.9% increase in gross revenues during 1966, from $3.57 billion to $4.25 billion, net earnings increased only 10.3% from $477 million to $526 million. Earnings per share gained just 7.0%, to $9.66 per share, from $9.03 per share last year when 3% fewer shares were outstanding. IBM Chairman T. J. Watson, Jr. attributed the slower earnings growth to "heavy introductory expenses and higher depreciation expense associated with the phasing in of System/360."

- Surprisingly, in a period of record shipment rates of IBM data processing equipment, the revenue from both tab and computer equipment accounted for a lower percentage of IBM's gross income. DP equipment slipped from 77% to 76% of IBM's total income, accounting for only 70.7% of IBM's revenue increase during 1966. Data processing supplies, office products, service bureau (SBC) and educational services (SRI) accounted for 20% of IBM's '66 revenue, up from 19% last year. The remaining 4% was contributed by military, space, and other special programs for the Federal Government.

- World Trade Corp., IBM's subsidiary which handles business outside the United States, supplied 62% of IBM's total earnings increase of $49.2 million last year. Growing faster than the domestic corporation during 1966, World Trade had $1.3 billion revenues, 31% of the corporation's total. Its revenue increase of $232.6 million, however, accounted for 34.5% of IBM's total gross revenue gain during the year, and its 1966 earnings of $174.6 million was one-third of the corporation's total earnings for the year.

- IBM added over 25,000 employees during 1966, bringing its worldwide payroll to almost 200,000. Certainly the training costs and the reduced productivity of these new employees helped keep earnings down during the year.

- Worldwide capital expenditures were up 36% to $1.58 billion. These paid for rental machines and parts; factory, laboratory, and office equipment; land and buildings -- the company added over 5.6 million

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square feet to its facilities during the year. Also, the book value of rental equipment on lease to customers increased by 31%, from $3.33 billion to $4.36 billion.

- At yearend 1966, IBM's plants around the world were producing over 1000 of its 360 systems a month. When two recently announced plants in Japan and England are completed, the company will have 22 manufacturing locations and 13 laboratories around the world -- all engaged in the development and/or production of 360 equipment and components.

Unexpected records

Informed sources report that IBM's revenue growth was substantially larger than its own forecasts for 1966. The 18.9% increase contrasts sharply with the 10.3% increase achieved in 1965 and the 13.1% revenue growth registered during 1964. Much of this difference was due to reduced replacement rates of second-generation IBM computers.

For one thing, users of new 360 equipment have found that reprogramming efforts and software development for new applications on their 360 computers have taken longer than expected. As a result, users have kept their second generation equipment longer than expected. Also, delivery delays experienced with the 360 -- and a shortage of personnel trained in 360 programming -- have maintained the 1401 as a popular machine. Indeed, 1401's accounted for 14% of IBM's total revenues during 1966, and even now delivery time on a 1401 system is quoted as nine months!

IBM's substantial revenue growth reflects the difference between forecasted and actual revenue results. During 1966, the company's domestic DP division expected to increase its monthly rental base by $25 million. Instead, it increased it some $36 million during the year. . . 44% ahead of forecasts. And World Trade -- with more of its equipment going to first-time customers -- experienced an even larger percentage increase in DP equipment rental. Net yield on World Trade orders is running about 46%, compared with 34% in the U. S.

Some setbacks

IBM has had some software delays for small and medium-sized machines, but most users report these are being worked out. A few 360's are being sent back and replaced by competitive equipment, but -- as IBM's impressive on-order figures show -- most customers are staying with the giant.

But in the large computer field -- especially in time sharing -- IBM is stubbing its toe. According to Chairman T. J. Watson, Jr., ". . .we have experienced delays in meeting our original objectives for some of the advanced programming systems needed to enable the large-scale computers and time-sharing systems to achieve their maximum capability. While significant progress is being made in this area, it has been necessary to withdraw at this time certain of the most advanced programming systems support for time sharing."

With some 60 universities -- and several large companies -- expecting the 360/67 to meet their time-sharing requirements, this withdrawal could give competitors a real market opportunity. Indeed, IBM announced the model 67, and its predecessor models 64 and 66, rather hurriedly, primarily as a "consider us" response after significant time-shared computer contracts were landed by competitors. . .

particularly General Electric. IBM certainly isn't giving up on large time-shared systems, but it may well lose a limited number of large dollar value time-shared computer contracts to GE, Univac, Control Data, and perhaps Burroughs, in the next twelve months. To IBM this represents some loss of prestige, but only a small percentage of revenue.

Antitrust Action

The Sword of Damocles dangling above IBM's head, however, is the current careful "preliminary investigation" that the Justice Department's antitrusters are making of the structure of the computer industry. Recent stories in the business press have played up the possibility that IBM's marketing, pricing, and patent licensing policies will be the special target of Justice Department investigation. However, if Justice's antitrust people are looking for evidence of an unsatisfactory competitive climate in the computer industry, we feel they have chosen a rather untimely and unrewarding moment to act. Here's why:

- Current computer customers are ordering more equipment than the production capacity and the capital resources of the firms in the business can easily handle. Delivery delays of six to thirty months are commonplace. The number of computers on order, now over 24,000, is equal to 70% of the total number of computers installed over the last eight years. Nearly all firms in the industry are enjoying record backlogs.

- IBM's competitors are largely outclassing it in terms of sales and earnings growth. IBM was only a middle-of-the-list performer in terms of sales growth last year, and probably was last in earnings improvement. Here's how the leading computer industry firms performed in 1966:

Firm	Value of Computers Shipped in 1966 ($ Millions)	1966/1965 % Increase in Revenues	1966/1965 % Increase in Earnings
Burroughs	$ 60	7%	77%
Control Data	200	32%*	1420%*
Digital Equipment	20	78%*	241%*
General Electric	190	N/A	N/A
Honeywell	270	24%(Est.)	13%(Est.)
IBM	2500	19%	10%
NCR	95	16%(Est.)	13%(Est.)
RCA	95	20%(Est.)	28%(Est.)
SDS	30	26%(Est.)	12%(Est.)
Sperry Rand	195	23%+	97%+

* For 6 months ended Dec. 31
\+ For 9 months ended Dec. 31

Early press reports held that complaints from IBM's competitors in the computer industry inspired the antitrust investigation. No computer manufacturer admits to filing a complaint, however, and we feel that any recent complaints on IBM's pricing and marketing policies have probably come from leasing companies. Firms making a business of buying IBM DP equipment and then leasing it to users

are largely dependent on IBM for maintenance service on the equipment and for the parts, manuals, and customer assistance that helps extend the leasing lifetime of the DP equipment. However, this dependence of one company on the business policies of another is riddled with potential problems. For example, if IBM increases the maintenance prices and reduces the purchase prices of its DP equipment, present and future customers would feel little effect (most are renting from IBM anyway). However, this action would substantially increase the operating costs of leasing companies with millions of dollars worth of DP equipment being maintained by IBM. Realizing this, several leasing companies have been building up in-house maintenance staffs for tab equipment, but few are likely to take on the more complicated maintenance needed by computer systems.

Also, the longer the contract a leasing company is able to write on its equipment, the lower its risk is and the more secure its profits. The willingness of a customer to undertake a long-term lease is influenced by his information on when more advanced, efficient DP equipment will be available. Therefore, when an industry leader like IBM announces new DP equipment with more attractive price/performance features than current gear, its announcement policy can restrict the ability of leasing companies to obtain long-term commitments on their equipment. For example, IBM introduced its 360 computer line in April, 1964. It stated deliveries of the first units would be made in mid-65, giving many customers the impression that they might be able to install one of the more popular 360 models shortly thereafter. Actually, record order backlogs and repeated delivery delays caused the true delivery date available to a typical customer ordering a popular 360 model in '64 to be closer to late '66 or '67. In the meantime, companies leasing second generation computers had to settle for short-term leases as customers waited for IBM to clarify the delivery policy on the 360.

Looking ahead, leasing companies now embarking on 360 leasing programs foresee the likelihood that IBM will announce a new generation of computers in 1969/70. Most of these leasing companies are amortizing their 360's over a ten-year usage life, so they are quite concerned that IBM's announcement procedure on its fourth-generation product line will cause them the same marketing problems that the 360 announcement caused firms leasing second generation computers. These firms would surely like to see IBM forced to postpone any announcements of a new product line until it had worked out production problems and could guarantee customers a firm delivery date.

Quo Vadis?

IBM goes into 1967 with most of its production and programming problems on the 360 solved, and manufacturing muscle that's putting out over 1,000 360 systems per month. However, IBM isn't likely to let its efficient marketing organization coast along on the support of its record backlog. Rather we expect that IBM will begin this year a major DP marketing program aimed at small business, beginning with a series of data processing services for firms that can't even afford the smallest business computer yet announced. This will extend IBM's DP business into the large and highly unsaturated market for data processing capability now being partially served by electronic accounting machines from firms such as Burroughs, Friden, NCR, and SCM.

We anticipate IBM will introduce this year a small computer -- perhaps labelled the 360/10 -- that will offer card reader/punch equipment, a low-speed printer, and a limited memory processor for a package rental of $800 to $1,000 a month. This unit, in all probability, will be capable of hooking into a large central computer.

and serve as a data communications terminal processor for jobs that require large amounts of memory and/or powerful processing capabilities.

Predecessor to 360/10?

A precursor of this marketing plan can be detected in IBM's introduction of a new high-performance data transmission terminal. This terminal, called the 2780, comes in four models that offer various combinations of printing, card reading, and card punching. It has its own buffer storage, and allows the following:

- Data transmission speeds up to 400 characters a second;
- Printing of up to 300 lines per minute;
- Card reading up to 400 cards per minute;
- Card punching up to 270 cards per minute.

Thus, the 2780 -- with deliveries scheduled for this fall -- is a medium-speed computer input/output unit. Also, when it isn't connected to a computer, it can be used to list cards off-line, or to communicate directly with one or more other terminals. The 2780, which rents for $700 to $1,000 a month, may well form the basis for IBM's new small business computer. One central IBM computer could handle the processing demands of many 2780 terminals located at customer sites. With a small processor connected directly to the terminal, this unit could perform as a small card computer that also can tap the abilities of a large computer, through a communication link, for major jobs. The customer would be charged a basic monthly rate for his on-site computer and also a usage charge for access to the large computer. . .allowing virtually unrestricted upgrading capability.

Prognosis

During 1967, we expect IBM to install some 13,000 of its 360 computers throughout the world. In addition, revenue from second generation equipment will continue strong and purchases of 360's should pick up as programming delays and difficulties diminish. As a result, IBM should be able to raise per share earnings almost 25% to $11.25. This can happen even in the face of record depreciation charges estimated at $845 million, versus $640 million for 1966.

All in all, IBM's future looks very attractive. It is in a commanding position in the computer market, and has immense good will built up among its customers. Even at today's levels, IBM offers an excellent opportunity for investors.

EDP LEASING NOTES

Standard Computers, Inc., a new EDP leasing firm, recently closed contracts for several large computers with major firms such as Hughes Aircraft and Aerojet-General. The Philadelphia company currently has over $10 million of third generation computers on lease and another $10 million in customer commitments.

Standard Computers specializes in "short-term, non-payout leasing of electronic data processing and data communications equipment." Current leases range from one to four years. For the long term, a spokesman says, the company is using leasing as a means of acquiring assets, and as machines are turned in, the firm plans to get into the used computer business. This market, the firm's founders feel, is one that to date has been underrated.

The company was started in 1965 by personnel from, and with the financial participation of, Auerbach Corp., Lease Financing Corp., and Blair & Co. During the

summer of 1966 it made its first public offering of 100,000 shares of common and $2 million in convertible subordinated debentures. The common was offered at $5 a share and currently is selling over the counter at slightly more than $10, the convertible price.

Primarily, SCI expects to lease larger IBM 360 equipment. Thus, it consciously shys away from 360/20's, since it looks to the customer who wants to upgrade as its best market for used computers. Aerojet-General has a 360/65 on lease to SCI, with another on order, and a 360/40. Other SCI customers with 360/40's or 360/30's are Richardson-Merrell, Inc., Scott Paper Co., and Braniff International. SCI's large installation at Hughes, however, is GE equipment -- a 635 and four 115's.

Levin-Townsend Computer Corporation, another firm specializing in the leasing of computer systems, had net income of $790,985 or 83¢ a share for the six months ended December 31st, on revenue of $3.1 million. Comparable earnings figures for the same period in 1965 are $161,131 or 26¢ a share. At September 30th Levin-Townsend owned 38 computer systems acquired at a cost of $14.7 million. Included were 27 IBM 360 systems, 6 IBM 1400 series computers, and 5 other computer models. All equipment is currently on rental. The company closed over $5 million of additional computer leases in the past 4 months, and plans to have $20 million of computers on lease by the end of January.

Since December 1963 Levin-Townsend Computer has acted both as a principal in developing computer leases, as well as a sales agent for G-C Computer Corporation. On October 18th G-C notified Levin-Townsend that it considered the sales agreement to have been breached by Levin-Townsend, and no longer in effect. Levin-Townsend has challenged this, and commenced a suit against G- C which seeks to compel G-C to continue paying commission under the terms of the agreement. Income from G-C Computer in the six months ended September 30, 1966 represented 10.5% of the gross revenues of Levin-Townsend. In contrast, in fiscal 1964 revenues from G-C Computer Corporation accounted for 61.5% of gross revenues.

RAILROAD INDUSTRY INCREASES COMPUTER USE 6.1% IN FIVE MONTHS; IBM RETAINS OVER 85% OF MARKET

Significant progress was made in the last five months in the use of computers in the railroad industry. According to a report just issued by the Association of American Railroads, the number of railroads using computers has increased 13.5%, from 52 to 59. The number of computers in the industry has grown from 181 to 192, a 6.1% increase. The most substantial change has been in the installation of "third generation" computers, in particular, the 360 series. The railroads report a total of 24 360's installed, a 50% increase since July 1, 1966 (see EDP I&MR of 8/18/66).

The manufacturers concentration in the industry has shifted since July, 1966:

Manufacturer	Percent Concentration by No. of Systems July 1, 1966	January 1, 1967	Change
IBM	87.3	86.5	-0.8
Univac	7.7	8.9	+1.2
Honeywell	1.1	1.0	-0.1
Burroughs	0.55	0.5	--
G. E.	2.8	2.6	-0.2
Collins	0.55	0.5	--
	100.00	100.0	

The chart on the next page summarizes the distribution of computers in the railroad industry.

SUMMARY OF COMPUTERS INSTALLED IN THE RAILROAD INDUSTRY

INCLUDES COMPUTERS INSTALLED THROUGH JANUARY 1, 1967.

RAILROAD	NO. OF LOC.	IBM															UNIVAC						HONEYWELL		BUR-ROUGHS	GE			COL-LINS	TOTAL
		360				1400				1974	7000											STEP								
		20	30	40	50	01	10	40	60		10	44	70	74	80	7740	I	III	90	418	1004	2	H 200	1000	B 283	4000	425	DN 30		
ALTON & SOUTHERN	1							2																		1				3
*ASSOCIATION OF AMERICAN RAILROADS	1					1																								1
ATLANTIC COAST LINE	1						1		2																					3
ATCHISON, TOPEKA & SANTA FE	2							2	2					1																5
BESSEMER & LAKE ERIE	1								1												1									2
BOSTON & MAINE	1																		1		1									2
CANADIAN NATIONAL	6					13								1																14
CANADIAN PACIFIC	3			1		5									1															7
CENTRAL OF NEW JERSEY	1					1											1	3						1						1
CHESAPEAKE AND OHIO - BALTIMORE AND OHIO	3						1																							6
CHICAGO, BURLINGTON & QUINCY	1						1	1	1																					3
CHICAGO GREAT WESTERN	1							1																						1
CHICAGO, MILWAUKEE, ST. PAUL & PACIFIC	1					2							1																	3
CHICAGO & NORTH WESTERN	2		1			4							1																	6
CHICAGO, ROCK ISLAND & PACIFIC	1						1	1	1																					3
CLINCHFIELD	1					1																								1
COLORADO SOUTHERN	1							1																						1
DELAWARE & HUDSON	1					1																			1		1			1
DENVER & RIO GRANDE WESTERN	1																													2
DETROIT, TOLEDO & IRONTON	1		1																											1
ELGIN, JOLIET & EASTERN	1		1			1																								2
ERIE LACKAWANNA	1					1		1	1																					3
*FLORIDA EAST COAST	1					1																								1
GRAND TRUNK WESTERN	1					2																								2
GREAT NORTHERN	5																1	1		1	4	1								8
GULF, MOBILE & OHIO	1					1																								1
*HOUSTON BELT & TERMINAL	1		1																											1
ILLINOIS CENTRAL	1					1			2						1															4
ILLINOIS TERMINAL	1					1																								1
KANSAS CITY SOUTHERN	1			1		1																								2
LEHIGH VALLEY	1		1																											1
LONG ISLAND	1			1																										1
LOUISVILLE & NASHVILLE	1		1						2		1																			4
MAINE CENTRAL	1																						1							1
MISSOURI-KANSAS-TEXAS	1					2																								2
MISSOURI PACIFIC	1					1			2					1																4
MONON	1					1																								1
NEW YORK CENTRAL	5		1			3			2		3			1						1									1	12
NEW YORK, NEW HAVEN & HARTFORD	1					2																								2
*NORFOLK & SOUTHERN	1							1																						1
NORFOLK & WESTERN	3		1			4	1																							6
NORTHERN PACIFIC	1						1																							1
*PATAPSCO & BACK RIVER	1	1																												1
PENNSYLVANIA	5		3	3	1	1	2				1			1																12
*PHILADELPHIA, BETHLEHEM & NEW ENGLAND	1	1																												1
PULLMAN	1					1																								1
RAILWAY EXPRESS	13					5				9																				14
READING	1					2																								2
ST. LOUIS & SAN FRANCISCO	1					1		1					1																	3
ST. LOUIS & SOUTH WESTERN	1					1																								1
SEABOARD AIR LINE	1					2																								2
SOO LINE	1					1																								1
SOUTHERN	1		2			2						3				2														9
SOUTHERN PACIFIC	2		1	1		2			1					1																6
*TOLEDO, PEORIA & WESTERN	1					1																								1
TERMINAL RAILROAD (TERA)	1					1		1																						2
UNION PACIFIC	1					2			2						1															5
WESTERN MARYLAND	1																				1						1	2		1
WESTERN PACIFIC	1																													3
TOTAL	97	2	14	7	1	72	8	12	19	9	5	3	3	6	3	2	2	4	1	2	7	1	1	1	1	1	2	2	1	192
*=ADDITION I=INCREASE D=DECREASE WHEN COMPARED WITH SUMMARY OF MAY 18, 1966		1	*	1	1		1	0	1	0										1	1									1

STOCK MARKET REPORT ON SELECTED EDP FIRMS

January 6 - 20, 1967

NEW YORK STOCK EXCHANGE	1966/67 High	1966/67 Low	2 weeks Sales in 100's	2 weeks High	2 weeks Low	Last	2 weeks Net Change	2 weeks % Change
Addressograph-Multigraph	77 3/8	49 1/8	2114	54 5/8	49 1/4	53 1/4	-3/8	-0.70
American R & D	47 1/2	20 1/4	869	47 1/2	39	46 3/8	+6 3/4	+17.03
Ampex Corp	29 7/8	17	8874	29 7/8	23 5/8	29 7/8	+5 7/8	+24.48
Burroughs	94 1/8	49 1/4	3565	94 1/8	87	89 1/8	-3/8	-0.42
Collins Radio	85 3/8	37 5/8	3720	67 7/8	56 3/8	67 1/4	+9 5/8	+16.70
Control Data	44 1/4	23 5/8	10,743	44 1/4	38 1/2	43 1/2	+5 1/4	+13.72
Electronic Assoc	27 1/8	12 1/4	1596	21 1/2	18 1/4	21	+2 1/8	+11.26
General Electric	120	80	3107	89 3/8	84 5/8	88 3/4	+3/4	+0.85
Honeywell	96	53 1/3	1940	73 3/8	66 3/4	70 1/8	+1/8	+0.18
IBM	397	289 1/2	1400	397	379	390	+12	+3.17
Inter Tel & Tel	82 3/4	58 1/8	2573	82 3/4	76	80 5/8	+4 1/4	+5.56
Litton	87 7/8	56 5/8	2005	87 7/8	79 1/2	86 1/8	+5 1/8	+6.33
Nat Cash Register	91 1/2	59	1050	80 1/2	69	79 5/8	+9 3/8	+13.34
RCA	62 1/4	36 3/4	5666	47 1/8	43	46 5/8	+1 3/8	+3.04
Raytheon	59 3/8	36	5416	59 3/8	50	57 3/8	+5	+9.55
Scientific Data	92 1/2	41 1/4	3303	92 1/2	73 1/2	90	+14 1/8	+18.62
SCM	91 7/8	42 1/8	8319	67 5/8	52 5/8	67 5/8	+10 3/4	+18.90
Singer	64 3/4	39 3/8	1486	54	48 1/4	54	+3 1/2	+6.86
Sperry Rand	33 5/8	17 1/8	13,257	31 1/2	28 3/8	29 7/8	+1 1/2	+5.29
Teledyne	133	50 3/8	3350	107	84 5/8	106 3/4	+19 3/8	+22.17
NYSE COMPUTER STOCK AVERAGE							+5.81	+9.80
AMERICAN STOCK EXCHANGE								
ANelex	28	7 3/8	357	14 7/8	12 1/4	13 3/4	--	--
Audio Devices, Inc	41 1/4	17	441	24 1/4	21 5/8	23 7/8	+1 5/8	+7.14
Bunker-Ramo	10 1/2	4 5/8	1104	8 5/8	7 1/2	8 3/8	+1/2	+6.35
Cal Comp	35 5/8	13 1/4	604	35 5/8	31 3/4	32 3/4	-1/8	-0.38
Clary	8	3 5/8	260	5 1/8	4 1/4	4 7/8	+3/8	+8.33
Computer Application	26 1/4	8	297	16	14	15 1/8	-3/8	-2.42
Computer Science	37 1/4	15 1/4	1817	29 1/2	22 1/2	29 1/4	+6.3/8	+21.07
Digital Equipment	35 1/2	27 1/4	892	35 3/8	30 1/2	35 3/8	+5 1/8	+16.94
Leasco Data Proc Equip Corp	40 5/8	18 1/2	815	40 5/8	34	37 1/4	+5/8	+1.74
Levin-Townsend Comp Corp	26 7/8	8 1/2	869	18 5/8	10 7/8	17	+5 1/4	+44.68
Milgo Electronics	8 7/8	4	205	6 3/8	5 1/4	6 1/8	+5/8	+11.36
Planning Research	36 1/2	12 7/8	176	22 3/4	20	21 7/8	-1/8	-0.57
Potter Instrument	26 3/8	9 1/8	284	14 3/4	12 3/8	14 5/8	+1 5/8	+12.50
AMEX COMPUTER STOCK AVERAGE							+1.65	+9.75

OVER-THE-COUNTER	1966/67 High Bid	1966/67 Low Bid	January 20 Bid	January 20 Asked	2 weeks ago Bid
Applied Data Research, Inc	6 3/4	2 1/4	4 3/4	5 1/8	4 1/2
Aries Corp	8 3/4	3	11 1/4	11 5/8	8 3/4
Automatic Data Processing	28 1/2	21 3/4	25 3/4	26 1/2	24 1/2
Bolt, Beranek & Newman, Inc	16	7 3/8	9 3/4	10 1/4	9 3/4
C-E-I-R	15 1/4	5 3/4	8 3/8	8 5/8	6 7/8
Computer Usage	25 1/2	16 3/4	25 1/2	26 1/2	21
* Cyber-tronics	6 1/4	4	6 1/4	7	--
Data Products	4	2 1/4	3 1/2	3 3/4	2 1/2
Digitronics	12 3/4	4 3/4	7 5/8	8	6 1/8
Documentation, Inc	8 1/2	3 3/8	4	4 3/8	4 3/8
DPA, Inc	19 7/8	3 5/8	5 1/2	6	4 1/2
Electronic Memories	26	10	13 7/8	14 1/4	13
Fabri-Tek	26	5 3/4	7 3/4	8 1/8	6 7/8
* G-C Computer	13 1/8	8 1/4	12 7/8	13 1/4	--
Informatics, Inc	8 1/2	7 1/2	9 3/4	10 1/4	7 5/8
Management Assistance	45 3/4	11 1/4	17	17 1/4	15 1/8
Memorex	72 1/4	31 1/2	68 1/4	69	65 3/4
Mohawk Data Sciences	46	19	39 1/8	39 5/8	32
Randolph Computer Corp	21 3/4	10	18 1/2	19 1/2	15 3/4
Recognition Equipment, Inc	72	33	61 1/2	63 1/2	53
Systems Engineering Labs			11 3/8	11 7/8	8 5/8
University Computing Co			26 1/2	27	22 7/8

* New Listing on this table.

February 10, 1967 Vol. 2, No. 18

SPECIAL FEATURE THIS ISSUE:
EDP 100 Listing. . . . . Page 3

E|D|P
INDUSTRY AND MARKET REPORT

A SEMI-MONTHLY NEWSLETTER FOR EXECUTIVES IN THE ELECTRONIC DATA PROCESSING INDUSTRY, AND THE FINANCIAL COMMUNITY.

P. J. McGovern, Editor
Telephone 617/332-8840

Exclusive Report - THE EDP 100

TOP 100 COMPUTER USERS AMONG INDUSTRIAL FIRMS HAD OVER $2 BILLION WORTH OF COMPUTERS AT WORK BY MID-1966

A tip to computer salesmen: If you want to sell over a third of the market for computers among industrial firms, limit your calls to just 100 top accounts. These 100 have over $2 billion worth of computers installed and account for 34.7% of the total value of computers used by industrial corporations. Indeed, they use nearly 16% of the $13 billion worth of computers installed in the world by mid-'66.

These figures are derived from a six-month-long research study of the value of computer and related data processing equipment in use by the 500 largest industrial corporations in the U. S. and the 200 largest foreign-based industrial concerns. The study was conducted by the International Data Corporation, publishers of this newsreport. The resulting roster of the top 100 computer customers, labelled the EDP I&MR "EDP 100", appears on pages 3-5 of this issue.

Preparing the list

The installed value of computers and related data processing equipment was calculated by our research staff from information in the IDC Computer Installation Data Files and Punched Card Processor Data Files for the United States and overseas, maintained by the International Data Corporation. In most instances, these figures have been confirmed by the companies involved; EDP I&MR, however, takes full responsibility for their accuracy.

Financial statistics are those compiled by Fortune magazine. U. S. figures were published as the Fortune 500 list in the July 15, 1966 issue and those for foreign organizations appeared in Fortune's August, 1966 issue.

To qualify as industrial corporations, and thus be included in this study, firms must have received at least 50% of their revenues from manufacturing or mining during the most recent fiscal year. AT&T, a utility, would therefore not qualify, even though it is probably the largest computer user outside the Federal Government. However, Western Electric, its manufacturing affiliate, is included in the EDP 100 as number 11, with $50.8 million of installed computers.

Also, companies whose primary products are digital computer systems -- such as IBM and Control Data -- were not considered for the EDP 100. There is virtually no way to separate computers used for product development, and programming and sales support work from those actually used for internal business in such firms.

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Interpretation

It is no surprise that the world's largest manufacturing corporation, General Motors, heads the list as the world's largest computer user among manufacturers. Other firms tend to line up by size within their industry classifications, but there are quite distinct characteristics for computer usage among different industry groups. As Table I indicates, the twelve aerospace firms on the EDP 100 list account for 21.8% of the computers included in this study, but the eight miscellaneous firms have only 2.7% of the computers.

The comparison between U. S. and foreign firms is also interesting. Although thirty-five of the firms on the EDP 100 are foreign based, they use only 18.8% of the computers. To some extent, this indicates the relative immaturity of the foreign market and one of the reasons for the higher growth rate currently being achieved in this market as foreign firms catch up with their U.S.-based counterparts in the value of computers used to support their business activities.

As guidelines to using the EDP 100, we have calculated three possible measurements of computer usage. Tables II, III, and IV give the value of computers for each $1000 in sales, for each $1000 in assets, and per employee. . . for each industry group, U.S.-based and foreign. The results of each measurement are different, as the bar charts illustrate, but they serve as useful yardsticks in evaluating computer usage. By each of these measurements, however, the aerospace firms clearly have the highest density of computer use, in most cases by a factor of three. And within this industry, the contrast between U. S. and foreign firms is even more spectacular. The U. S. aerospace industry has impressive ratios, of course, because of its many large government contracts.

U. S. firms, as Table II shows, generally use a considerably higher number of computers for each $1000 in sales than do the foreign firms. Much of this, naturally, stems from the higher labor costs in the U. S. As foreign pay scales rise, this pressure could well accelerate foreign purchases of computers. At present, using this measurement, U. S. firms are 87% ahead of foreign ones in the food and beverage industries, 79% ahead in aerospace, and virtually tied among primary metals manufacturers and miscellaneous firms.

With the exception of firms in the aerospace industry, companies on the EDP 100 seem to be closer together in computers per $1000 assets than by any other measurement. (See Table III.) On the other hand, as Table IV illustrates, there is wide fluctuation in the value of computers per employee.

Interesting comparisons can be made by looking at companies, or industries, in light of the different measurements. The petroleum industry, with a high investment in automated operations, has a high value of computers per employee of $447, although its value of computers per $1000 in assets is a very low $6.68.

Readers who have computers will find it interesting to calculate the three measurement ratios for their own company and compare them with those organizations included on the EDP 100 list. However, these measurements, by themselves, do not indicate that one company is better or ahead of another. A firm's effectiveness in using computers certainly cannot be inferred from simple ratios that relate the value of computers used with sales, assets, or number of employees. In fact, the reader may note with interest the lack of any clear relationship, by and large, between a particular company's percentage of profit and the relative density of its computer use as compared with its industry average.

EDP I&MR "EDP 100"

NAME	RANK BY VALUE COMPUTER	VALUE COMPUTERS INSTALLED ($ MILLION)	RANK BY SALES SIZE	1965 SALES ($ MILLION)	VALUE COMPUTERS $1000 SALES	NO. EMPLOYEES (1000)	VALUE COMPUTERS EMPLOYEE	SALES EMPLOYEE	ASSETS ($ MILLION)	VALUE COMPUTERS ASSETS	% PROFITS	INDUS-TRY GROUP+	FOREIGN OR DOMESTIC
General Motors	1	$174.61	1	$20,734	$8.42	735	$238	28,247	$12,586	13.87	10.3	A	D
General Electric	2	95.05	4	6,213	15.30	300	317	20,710	4,300	22.10	5.7	E	D
Boeing	3	80.16	29	2,023	39.62	93	862	21,753	811	98.84	3.9	S	D
Lockheed Air	4	74.76	32	1,814	41.21	81	923	22,395	629	118.86	3.0	S	D
Ford Motor	5	72.29	2	11,537	6.27	364	199	31,695	7,597	9.52	6.1	A	D
Royal Dutch/Shell	6	67.12	15	7,181	9.27	186	358	38,608	2,671	24.93	8.7	P	F
Westinghouse	7	66.59	20	2,389	28.09	115	584	20,774	1,712	39.21	4.5	E	D
North Am Aviation	8	56.23	31	2,010	27.97	100	562	20,100	562	100.05	2.3	S	D
Standard Oil N J	9	52.64	3	11,471	4.59	148	356	77,506	13,073	4.03	9.0	P	D
Martin Marietta	10	52.57	95	603	87.18	30	1752	20,100	443	118.67	5.1	S	D
Western Electric	11	50.80	11	3,362	15.11	169	301	19,893	2,303	22.05	5.0	E	D
Chrysler	12	46.16	5	5,300	8.71	167	276	31,736	2,934	15.73	4.4	A	D
Gen Dynamics	13	43.74	41	1,473	29.69	85	515	17,329	670	65.28	3.3	S	D
U S Steel	14	43.22	8	4,400	9.82	209	207	21,053	5,452	7.93	6.3	I	D
Mobil Oil	15	42.46	7	4,907	8.65	81	524	60,580	5,212	8.15	6.5	P	D
Du Pont	16	40.40	12	3,021	13.37	109	371	27,715	2,848	14.18	13.5	C	D
Douglas Aircraft	17	39.46	86	767	51.45	60	658	12,783	565	69.84	1.9	S	D
Union Carbide	18	36.62	25	2,064	17.74	61	600	33,831	2,283	16.04	11.0	C	D
United Aircraft	19	34.49	46	1,430	24.12	72	479	19,861	741	46.54	3.4	S	D
Gen Tel & Elec	20	32.57	28	2,036	16.00	122	267	16,688	3,783	8.61	8.2	E	D
McDonnell	21	29.56	65	1,008	29.32	36	821	28,000	289	102.28	3.2	S	D
Gulf Oil	22	28.35	10	3,385	8.37	55	515	61,545	5,211	5.44	12.6	P	D
Eastman Kodak	23	25.82	43	1,463	17.65	55	469	26,600	1,445	17.86	16.9	C	D
Standard Oil Ind	24	24.85	16	2,472	10.05	41	606	60,292	3,514	7.07	8.9	P	D
Texaco	25	24.12	9	3,779	6.38	57	423	66,298	5,343	4.51	16.8	P	D
Standard Oil Cal	26	23.32	18	2,442	9.55	44	530	55,500	4,166	5.60	16.0	P	D
ITT	27	22.99	34	1,783	12.89	199	115	8,960	2,022	11.37	4.3	E	D
Gen Tire & Rubber	28	22.37	78	949	23.57	41	546	23,146	610	36.67	4.5	R	D
Goodyear Tire	29	18.92	23	2,226	8.50	104	182	21,404	1,638	11.55	4.9	R	D
Hitachi	30	18.76	59	1,149	16.33	129	145	8,906	1,704	11.01	2.3	E	F
Siemens	31	18.71	33	1,794	10.43	257	73	6,980	1,401	13.35	2.5	E	F
RCA	32	18.64	27	2,042	9.13	100	186	20,420	1,269	14.69	5.0	E	D
Dow Chemical	33	17.78	58	1,176	15.12	34	523	34,588	1,527	11.64	9.2	C	D
Bethlehem Steel	34	16.61	14	2,579	6.44	130	128	19,838	2,610	6.36	5.8	I	D
Philips' Gloeilamp	35	16.22	24	2,084	7.78	252	64	8,270	2,728	5.95	5.3	E	F
Monsanto	36	15.82	42	1,468	10.78	56	282	26,214	1,784	8.87	8.4	C	D

EDP I&MR "EDP 100"

NAME	RANK BY VALUE COMPUTER	VALUE COMPUTERS INSTALLED ($ MILLION)	RANK BY SALES SIZE	1965 SALES ($ MILLION)	VALUE COMPUTERS / $1000 SALES	NO. EMPLOYEES (1000)	VALUE COMPUTERS / EMPLOYEE	SALES / EMPLOYEE	ASSETS ($ MILLION)	VALUE COMPUTERS / ASSETS	% PROFITS	INDUS-TRY GROUP+	FOREIGN OR DOMESTIC
Firestone	37	15.27	36	1,610	9.48	88	173	18,295	1,260	12.12	5.4	R	D
Grumman Aircraft	38	14.53	84	852	17.05	32	454	26,625	249	58.35	2.5	S	D
Litton Ind	39	14.45	81	915	15.79	65	222	14,077	630	22.94	4.3	E	D
ICI	40	14.08	22	2,284	6.16	170	83	13,435	3,697	3.81	9.1	C	F
Bendix	41	13.52	87	754	17.93	44	307	17,136	485	27.88	3.7	E	D
Aug Thyssen-Hutte	42	13.18	35	1,725	7.64	94	140	18,351	1,472	8.95	1.6	I	F
General Foods	43	13.08	40	1,478	8.85	30	436	49,267	750	17.44	5.8	F	D
Phillips Petrol	44	12.72	44	1,451	8.77	30	424	48,367	2,029	6.27	8.8	P	D
Goodrich	45	12.25	74	980	12.50	44	278	22,273	746	16.42	4.1	R	D
Volkswagenwerk	46	12.16	21	2,317	5.25	125	97	18,536	1,137	10.69	4.1	A	F
AEG-Telefunken	47	11.95	66	1,034	11.56	128	93	8,078	767	15.58	2.4	E	F
Uniroyal	48	11.90	55	1,225	9.71	65	183	18,846	926	12.85	3.0	R	D
Mitsubishi H I	49	10.83	62	1,092	9.92	86	126	12,697	1,925	5.63	1.5	I	F
Unilever	50	10.82	6	5,101	2.12	294	37	17,350	3,105	3.48	3.5	F	F
Farbwerke Horchst	51	10.43	47	1,309	7.97	72	145	18,180	1,157	9.01	4.9	C	F
BASF	52	10.42	69	1,012	10.30	48	217	21,083	1,051	9.91	7.0	C	F
Proctor Gamble	53	10.37	26	2,058	5.04	37	280	55,622	1,337	7.76	6.5	C	D
Daimler-Benz	54	10.33	49	1,298	7.96	98	105	13,245	556	18.58	2.9	A	F
Rolls-Royce	55	10.06	98	354	28.42	50	201	7,080	342	29.41	3.7	S	F
Singer	56	9.99	75	980	10.19	101	99	9,703	891	11.21	4.5	M	D
Inter Paper	57	9.97	48	1,304	7.65	51	195	25,568	1,150	8.67	6.8	M	D
Collins Radio	58	9.53	99	282	33.79	17	560	16,588	185	51.51	1.6	E	D
Jones Laughlin	59	9.44	72	992	9.52	41	230	24,195	934	10.11	5.4	I	D
Union Oil of Cal	60	9.32	53	1,234	7.55	17	548	72,588	1,759	5.30	9.7	P	D
Swift	61	9.20	13	2,751	3.34	53	174	51,905	634	14.51	0.6	F	D
Finsider	62	9.08	76	979	9.27	76	119	12,881	3,361	2.70	2.6	I	F
English Electric	63	8.97	92	685	13.09	80	112	8,562	590	15.00	3.8	E	F
Robert Bosch	64	8.92	90	741	12.04	90	99	8,233	293	30.44	1.3	E	F
Atlantic-Richfield	65	8.71	70	1,002	8.70	17	512	58,941	1,493	5.83	9.0	P	D
Fiat	66	8.64	39	1,528	5.65	123	70	12,423	1,330	6.50	2.5	A	F
Farben Bayer	67	8.35	37	1,575	5.30	100	83	15,750	1,165	7.17	4.2	C	F
Yawata Iron & Steel	68	8.32	79	926	8.98	59	141	15,695	1,570	5.30	2.4	I	F
Sud-Aviation	69	8.14	100	268	30.37	27	301	9,926	556	14.64	0.4	S	F
Texas Instruments	70	7.86	97	436	18.03	34	231	12,823	271	29.00	5.7	E	D
American Home Prod	71	7.74	88	751	10.33	31	250	24,226	468	16.56	10.2	F	D

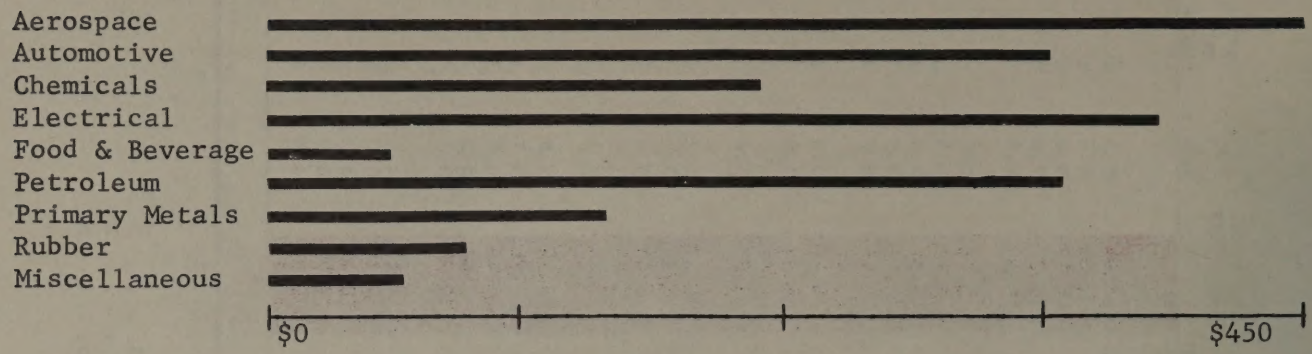
EDP I&M "EDP 100"

NAME	RANK BY VALUE COMPUTER	VALUE COMPUTERS INSTALLED ($ MILLION)	RANK BY SALES SIZE	1965 SALES ($ MILLION)	VALUE COMPUTERS $1000 SALES	NO. EMPLOYEES (1000)	VALUE COMPUTERS EMPLOYEE	SALES EMPLOYEE	ASSETS ($ MILLION)	VALUE COMPUTERS ASSETS	% PROFITS	INDUSTRY GROUP+	FOREIGN OR DOMESTIC
American Motors	72	7.74	73	991	7.81	32	242	30,969	457	16.94	0.5	A	D
Olin Mathieson	73	7.71	82	874	8.82	43	179	20,325	1,008	7.65	5.8	C	D
Sun Oil	74	7.66	80	925	8.28	21	365	44,048	1,206	6.35	9.2	P	D
Nestle	75	7.63	38	1,563	4.88	85	90	18,388	357	21.37	1.8	F	F
Continental Oil	76	7.55	45	1,450	5.21	21	359	69,047	1,679	4.50	6.6	P	D
Allied Chemical	77	7.54	60	1,121	6.73	37	204	30,297	1,269	5.94	7.5	C	D
Gutehoffnungshutte	78	7.33	68	1,023	7.17	77	95	13,285	902	8.13	0.5	I	F
SKF	79	7.32	94	653	11.21	68	108	9,603	786	9.31	4.0	M	F
National Dairy	80	7.31	30	2,017	3.62	45	162	15,750	853	8.57	3.5	F	D
Cities Service	81	7.28	56	1,201	6.06	21	347	57,190	1,635	4.46	8.7	P	D
Matsushita Elec	82	7.17	85	772	9.29	59	121	13,085	782	9.17	5.0	E	F
American Can	83	7.04	51	1,265	5.56	48	147	26,354	1,027	6.85	4.9	M	D
Sinclair Oil	84	6.86	50	1,275	5.38	19	361	67,105	1,694	4.05	6.0	P	D
British Petrol	85	6.81	19	2,408	2.83	60	113	40,133	3,856	1.77	9.4	P	F
Brown Boveri	86	6.80	93	684	9.94	78	87	8,769	656	10.37	1.2	E	F
Fried Krupp	87	6.51	52	1,252	5.20	122	53	8,746	N/A	N/A	2.1	I	F
Hawker Siddeley	88	6.38	63	1,067	5.98	112	57	11,179	859	7.43	N/A	S	F
Mannesmann	89	6.28	64	1,040	6.04	77	82	13,506	895	7.02	1.6	I	F
Inland Steel	90	6.14	77	967	6.35	31	198	31,193	972	6.32	7.1	I	D
Armco Steel	91	6.04	57	1,188	5.08	38	159	31,263	1,223	4.94	7.9	I	D
National Coal Bd	92	5.89	17	2,465	2.39	477	12	5,168	2,968	1.98	0.7	M	F
Tidewater Oil	93	5.83	91	706	8.26	8	729	88,250	996	5.85	8.1	P	D
Standard Oil Ohio	94	5.82	96	582	10.00	11	529	52,909	618	9.42	8.5	P	D
Colgate Palmolive	95	5.81	83	862	6.74	26	223	33,154	462	12.58	3.3	C	D
Rheinische Stahl	96	5.76	67	1,025	5.62	98	59	10,459	868	6.64	1.2	I	F
Anaconda	97	5.50	71	994	5.53	43	128	23,116	1,324	4.15	8.0	M	D
Renault	98	5.49	61	1,100	4.99	87	63	12,644	524	10.48	0.2	A	F
Massey-Ferguson	99	5.35	89	748	7.15	46	116	16,260	686	7.80	4.9	M	F
Continental Can	100	5.28	54	1,225	4.31	46	115	26,630	921	5.73	4.8	M	D
		$2,111.16		$205,206		9,330			$180,190				

+ CODES FOR INDUSTRY GROUP CLASSIFICATION IN EDP 100

Aerospace	S	Electrical	E	Primary Metals	I
Automotive	A	Food & Beverage	F	Rubber	R
Chemicals	C	Petroleum	P	Miscellaneous	M

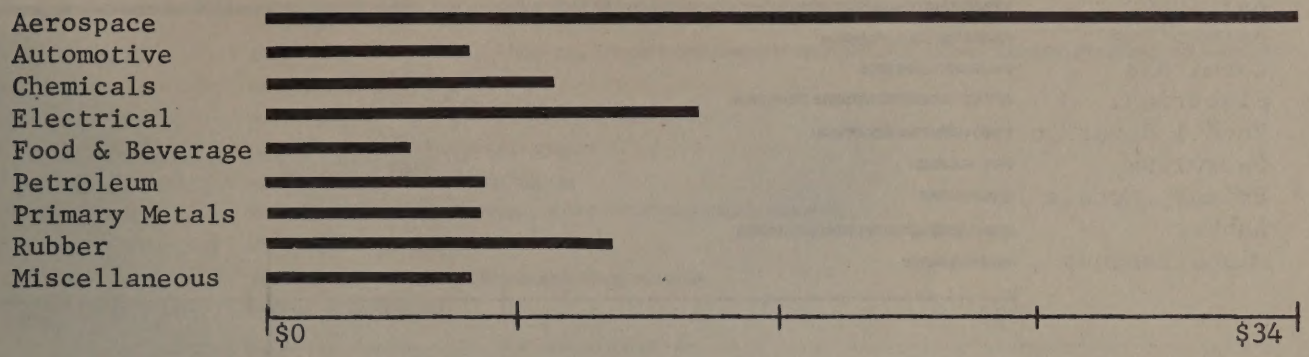
TABLE I EDP 100 -- DISTRIBUTION OF VALUE OF COMPUTERS WITHIN INDUSTRY GROUP



Industry Group	Number of Firms	Value Computers Installed ($ Millions)	% of Total Value of Computers Installed
Aerospace	12	$ 450.08	21.8%
U.S.-Based	9	425.50	20.6
Foreign	3	24.58	1.2
Automotive	8	337.42	16.3
U.S.-Based	4	300.80	14.5
Foreign	4	36.62	1.8
Chemicals	13	211.15	10.2
U.S.-Based	9	167.87	8.1
Foreign	4	43.28	2.1
Electrical	18	429.50	18.7
U.S.-Based	10	332.00	14.0
Foreign	8	97.50	4.7
Food & Beverage	6	55.80	2.7
U.S.-Based	4	37.35	1.8
Foreign	2	18.45	0.9
Petroleum	17	341.42	16.5
U.S.-Based	14	259.94	12.6
Foreign	3	81.48	3.9
Primary Metals	13	148.29	7.2
U.S.-Based	5	81.00	3.9
Foreign	8	67.29	3.3
Rubber	5	80.71	3.9
U.S.-Based	5	80.71	3.9
Foreign	--	--	--
Miscellaneous	8	56.34	2.7
U.S.-Based	5	37.78	1.8
Foreign	3	18.56	0.9
			100%

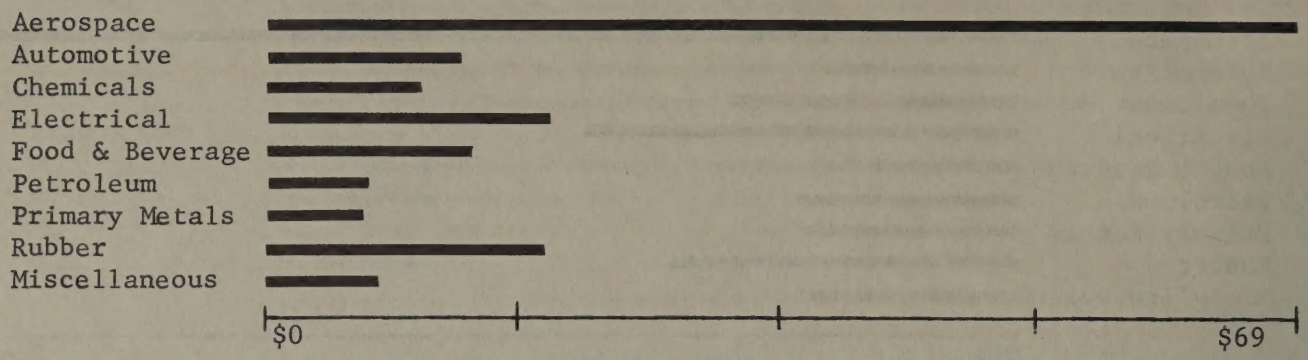
TABLE II

EDP 100 -- VALUE OF COMPUTER/$1000 SALES WITHIN INDUSTRY GROUP



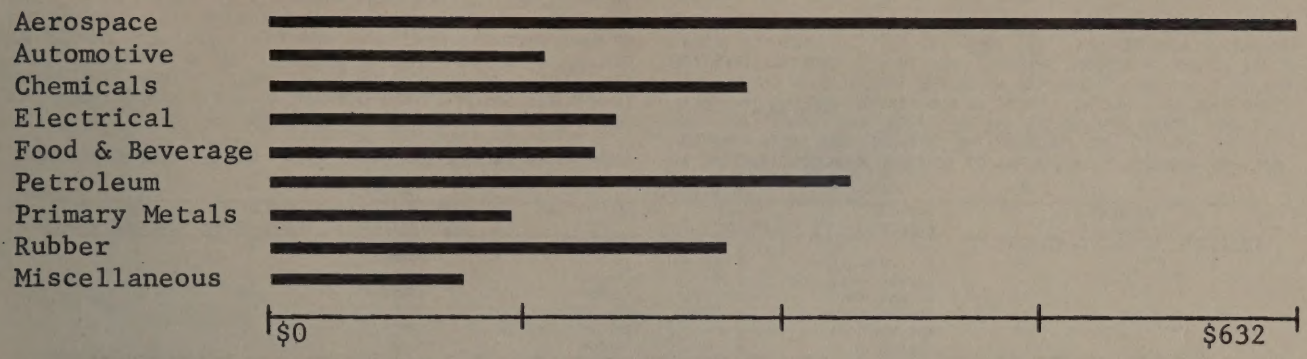
Industry Group	Number of Firms	Value of Computers/$1000 Sales High	Low	Average	Ratio U.S.-Based Foreign
Aerospace	12	$87.18	$ 5.98	$34.36	1.79
U.S.-Based	9	87.18	17.05	38.62	
Foreign	3	30.37	5.98	21.59	
Automotive	8	8.71	4.99	6.88	1.31
U.S.-Based	4	8.71	6.27	7.80	
Foreign	4	7.96	4.99	5.96	
Chemicals	13	17.74	5.04	10.13	1.52
U.S.-Based	9	17.74	5.04	11.33	
Foreign	4	10.30	5.30	7.43	
Electrical	18	33.79	7.78	14.73	1.56
U.S.-Based	10	33.79	9.13	17.61	
Foreign	8	16.33	7.78	11.31	
Food & Beverage	6	10.33	2.12	5.52	1.87
U.S.-Based	4	10.33	3.34	6.54	
Foreign	2	4.88	2.12	3.50	
Petroleum	17	10.05	2.83	7.52	1.37
U.S.-Based	14	10.05	4.59	7.90	
Foreign	3	9.27	2.83	5.77	
Primary Metals	13	9.92	5.08	7.46	0.99
U.S.-Based	5	9.82	5.08	7.44	
Foreign	8	9.92	5.20	7.48	
Rubber	5	23.57	8.50	12.75	--
U.S.-Based	5	23.57	8.50	12.75	
Foreign	--	--	--	--	--
Miscellaneous	8	11.21	2.39	6.75	0.96
U.S.-Based	5	10.19	4.31	6.65	
Foreign	3	11.21	2.39	6.92	

TABLE III - EDP 100 -- VALUE OF COMPUTERS/$1000 ASSETS WITHIN INDUSTRY GROUP



Industry Group	Number of Firms	Value Computers/$1000 Assets High	Low	Average	Ratio U.S.-Based Foreign
Aerospace	12	$118.86	$ 7.43	$69.18	5.04
U.S.-Based	9	118.86	46.54	86.52	
Foreign	3	29.41	7.43	17.16	
Automotive	8	18.58	6.50	12.79	1.21
U.S.-Based	4	16.94	9.52	14.02	
Foreign	4	18.58	6.50	11.56	
Chemicals	13	17.86	3.81	10.08	1.50
U.S.-Based	9	17.86	4.50	11.23	
Foreign	4	9.91	3.81	7.48	
Electrical	18	51.51	5.95	18.58	1.61
U.S.-Based	10	51.51	8.61	22.35	
Foreign	8	30.44	5.95	13.86	
Food & Beverage	6	21.37	3.48	13.66	1.15
U.S.-Based	4	17.44	8.57	14.28	
Foreign	2	21.37	3.48	12.43	
Petroleum	17	24.93	1.77	6.68	0.57
U.S.-Based	14	9.42	4.03	5.88	
Foreign	3	24.93	1.77	10.40	
Primary Metals	13	10.11	4.15	6.46	1.19
U.S.-Based	5	10.11	4.94	7.13	
Foreign	8	8.95	4.15	5.98	
Rubber	5	36.67	11.55	17.92	--
U.S.-Based	5	36.67	11.55	17.92	
Foreign	--	--	--	--	
Miscellaneous	8	11.21	1.98	6.96	1.15
U.S.-Based	5	11.21	4.15	7.32	
Foreign	3	9.31	1.98	6.36	

TABLE IV - EDP 100 -- VALUE OF COMPUTERS/EMPLOYEE WITHIN INDUSTRY GROUP



Industry Group	Number of Firms	Value of Computers/Employee High	Low	Average	Ratio U.S.-Based Foreign
Aerospace	12	$1752	$ 57	$632	4.20
U.S.-Based	9	1752	454	781	
Foreign	3	301	57	186	
Automotive	8	276	63	161	2.85
U.S.-Based	4	276	199	239	
Foreign	4	105	63	84	
Chemicals	13	600	83	281	2.64
U.S.-Based	9	600	179	348	
Foreign	4	217	83	132	
Electrical	18	584	64	206	2.90
U.S.-Based	10	584	115	290	
Foreign	8	145	64	100	
Food & Beverage	6	436	37	192	4.00
U.S.-Based	4	436	162	256	
Foreign	2	90	37	64	
Petroleum	17	729	113	447	1.75
U.S.-Based	14	729	347	484	
Foreign	3	359	113	277	
Primary Metals	13	230	53	139	1.66
U.S.-Based	5	230	128	184	
Foreign	8	141	53	111	
Rubber	5	546	173	272	--
U.S.-Based	5	546	173	272	
Foreign	--	--	--	--	
Miscellaneous	8	195	12	115	1.73
U.S.-Based	5	195	99	137	
Foreign	3	116	12	79	

MONTHLY COMPUTER CENSUS

THE NUMBER OF ELECTRONIC COMPUTERS INSTALLED OR ON ORDER AT ANY ONE TIME HAS BEEN INCREASING RAPIDLY DURING THE PAST SEVERAL YEARS. NEW MODELS HAVE BEEN OFFERED IN THE COMPUTER MARKET, AND FAMILIAR MACHINES HAVE GONE OUT-OF-PRODUCTION AND SUBSEQUENTLY BEEN RETIRED FROM ACTIVE USE AND DISMANTLED. SOME NEW COMPUTERS HAVE BEEN RECEIVED WITH OPEN ARMS BY USERS -- OTHERS HAVE BEEN GIVEN THE COLD SHOULDER.

TO AID OUR READERS IN KEEPING UP WITH THIS RAPIDLY CHANGING PROFILE OF COMPUTER USE, EDP I&MR PRESENTS THIS MONTHLY REPORT ON THE NUMBER OF GENERAL PURPOSE ELECTRONIC DIGITAL COMPUTERS MADE BY U.S.-BASED COMPANIES WHICH ARE INSTALLED OR ON ORDER AS OF THE PRECEDING MONTH. THESE CENSUS FIGURES INCLUDE INSTALLATIONS AND ORDERS OUTSIDE THE UNITED STATES. THE FIGURES ARE COMPILED AND UPDATED EACH MONTH BY THE INTERNATIONAL DATA CORPORATION, NEWTONVILLE, MASS., A MARKET RESEARCH FIRM SPECIALIZING IN THE INFORMATION PROCESSING INDUSTRY AND THE PUBLISHER OF THE EDP I&MR. WE HOPE THEY WILL SERVE AS A USEFUL "BOX-SCORE" OF PROGRESS FOR READERS INTERESTED IN FOLLOWING THE GROWTH OF THE U.S. COMPUTER INDUSTRY AND OF THE COMPUTING POWER IT BUILDS.

IN GENERAL, MANUFACTURERS IN THE COMPUTER FIELD DO NOT OFFICIALLY RELEASE INSTALLATION AND ON-ORDER FIGURES. THE FIGURES IN THIS CENSUS ARE DEVELOPED THROUGH A CONTINUING MARKET SURVEY CONDUCTED BY THE INTERNATIONAL DATA CORPORATION. THIS MARKET RESEARCH PROGRAM COMPILES AND MAINTAINS A WORLDWIDE COMPUTER INSTALLATION LOCATOR FILE WHICH IDENTIFIES, BY CUSTOMER, THE INSTALLATION SITES OF ELECTRONIC COMPUTERS. THE RESULTING CENSUS COUNTS ARE SUBMITTED TO INDIVIDUAL COMPUTER MANUFACTURERS FOR THEIR REVIEW AND VOLUNTARY CONFIRMATION.

COMMENTS ON THIS CENSUS FROM INFORMED READERS WILL BE WELCOMED.

AS OF JANUARY 10, 1967

NAME OF MANUFACTURER	NAME OF COMPUTER	SOLID STATE?	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS	NUMBER OF UNFILLED ORDERS
Advanced Scientific Instruments	ASI 210	Y	$3850	4/62	25	0
	ASI 2100	Y	$4200	12/63	7	0
	ADVANCE 6020	Y	$4400	4/65	13	5
	ADVANCE 6040	Y	$5600	7/65	8	6
	ADVANCE 6050	Y	$9000	2/66	6	6
	ADVANCE 6070	Y	$15,000	10/65	5	6
	ADVANCE 6130	Y	$1000	11/66	3	21
Autonetics	RECOMP II	Y	$2495	11/58	35	X
	RECOMP III	Y	$1495	6/61	7	X
Bunker-Ramo Corp	BR-130	Y	$2000	10/61	160	2
	BR-133	Y	$2400	5/64	29	40
	BR-230	Y	$2680	8/63	15	X
	BR-300	Y	$3000	3/59	35	X
	BR-330	Y	$4000	12/60	30	X
	BR-340	Y	$7000	12/63	20	X
Burroughs	205	N	$4600	1/54	42	X
	220	N	$14,000	10/58	34	X
	E101-103	N	$875	1/56	122	X
	B100	Y	$2800	8/64	172	12
	B250	Y	$4200	11/61	84	1
	B260	Y	$3750	11/62	231	2
	B270	Y	$7000	7/62	165	3
	B280	Y	$6500	7/62	128	5
	B300	Y	$10,000	7/65	135	78
	B2500	Y	$5000	1/67	0	45
	B3500	Y	$14,000	5/67	0	30
	B5500	Y	$22,000	3/63	61	11
	B6500	Y	$33,000	2/68	0	11
	B8500	Y	$200,000	2/67	0	2
Control Data Corporation	G-15	N	$1600	7/55	295	X
	G-20	Y	$15,500	4/61	25	X
	LGP-21	Y	$725	12/62	160	X
	LGP-30	semi	$1300	9/56	136	X
	RPC-4000	Y	$1875	1/61	65	X
	160*/160A/160G	Y	$2100/$4000/$12,000	5/60;7/61;3/64	461	2
	924/924A	Y	$11,000	8/61	29	X
	1604/1604A	Y	$45,000	1/60	59	X
	1700	Y	$4000	5/66	23	105
	3100	Y	$11,000	12/64	85	36
	3200	Y	$14,000	5/64	66	X
	3300	Y	$15,000	9/65	50	52
	3400	Y	$25,000	11/64	19	X
	3500	Y	$30,000	9/67	0	7
	3600	Y	$58,000	6/63	45	X
	3800	Y	$60,000	2/66	15	13
	6400	Y	$50,000	5/66	12	20
	6600	Y	$85,000	8/64	21	18
	6800	Y	$130,000	4/67	0	4
Data Machines, Inc.	620	Y	$900	11/65	38	25
Digital Equipment Corp	PDP-1	Y	$3400	11/60	60	X
	PDP-4	Y	$1700	8/62	57	X
	PDP-5	Y	$900	9/63	116	X
	PDP-6	Y	$10,000	10/64	23	2
	PDP-7	Y	$1300	11/64	110	30
	PDP-8;8/S	Y	$525;$300	4/65	610	520
	PDP-9	Y	$1000	12/66	1	60
	PDP-10	Y	$9000	7/67	0	7
El-tronics, Inc.	ALWAC IIIE	N	$1820	2/54	14	X
Electronic Associates, Inc.	8400	Y	$12,000	6/65	13	9
General Electric	115	Y	$1800	12/65	260	540
	205	Y	$2900	6/64	44	X
	210	Y	$16,000	7/59	48	X
	215	Y	$6000	9/63	54	X
	225	Y	$8000	4/61	203	X
	235	Y	$10,900	4/64	70	2
	415	Y	$9600	5/64	205	55
	425	Y	$18,000	6/64	85	44
	435	Y	$25,000	9/65	32	17
	625	Y	$50,000	4/65	20	16
	635	Y	$56,000	5/65	18	17
	645	Y	$90,000	7/66	2	10
Honeywell	DDP-24	Y	$2500	5/63	88	3
	DDP-116	Y	$900	4/65	148	30
	DDP-124	Y	$2050	3/66	27	38
	DDP-224	Y	$3300	3/65	50	9
	DDP-516	Y	$700	9/66	10	90
	H-120	Y	$3900	1/66	360	300
	H-200	Y	$8400	3/64	1020	150
	H-400	Y	$8500	12/61	115	X
	H-800	Y	$28,000	12/60	89	1
	H-1200	Y	$8000	2/66	68	100
	H-1400	Y	$14,000	1/64	12	X

NAME OF MANUFACTURER	NAME OF COMPUTER	SOLID STATE?	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS	NUMBER OF UNFILLED ORDERS
Honeywell (cont'd)	H-1800	Y	$42,000	1/64	21	1
	H-2200	Y	$12,000	1/66	22	64
	H-4200	Y	$20,500	3/67	0	10
	H-8200	Y	$35,000	3/68	0	3
	DATAmatic 1000	N	$40,000	12/57	2	X
IBM	305	N	$3600	12/57	138	X
	360/20	Y	$2000	12/65	1300	6400
	360/30	Y	$7500	5/65	2750	4450
	360/40	Y	$15,000	4/65	1450	1500
	360/44	Y	$10,000	7/66	24	150
	360/50	Y	$26,000	8/65	150	590
	360/62	Y	$55,000	11/65	1	X
	360/65	Y	$50,000	11/65	32	220
	360/67	Y	$75,000	10/66	6	56
	360/75	Y	$78,000	2/66	17	35
	360/90 Series	Y	$140,000	6/67	0	10
	650	N	$4800	11/54	170	X
	1130	Y	$1200	11/65	1000	4500
	1401	Y	$6600	9/60	7650	X
	1401-G	Y	$2300	5/64	1620	X
	1410	Y	$14,200	11/61	805	65
	1440	Y	$4800	4/63	3400	90
	1460	Y	$11,500	10/63	1760	X
	1620 I, II	Y	$4000	9/60	1670	20
	1800	Y	$7600	1/66	120	320
	701	N	$5000	4/53	1	X
	7010	Y	$22,600	10/63	215	X
	702	N	$6900	2/55	6	X
	7030	Y	$160,000	5/61	6	X
	704	N	$32,000	12/55	31	X
	7040	Y	$22,000	6/63	120	4
	7044	Y	$32,000	6/63	127	5
	705	N	$38,000	11/55	52	X
	7070, 2, 4	Y	$27,000	3/60	322	X
	7080	Y	$55,000	8/61	85	X
	709	N	$40,000	8/58	9	
	7090	Y	$63,500	11/59	45	X
	7094	Y	$73,500	9/62	115	2
	7094 II	Y	$78,500	4/64	130	4
National Cash Register Co	NCR - 304	Y	$14,000	1/60	25	X
	NCR - 310	Y	$2500	5/61	10	X
	NCR - 315	Y	$8500	5/62	390	145
	NCR - 315-RMC	Y	$12,000	9/65	36	43
	NCR - 390	Y	$1850	5/61	725	25
	NCR - 500	Y	$1500	10/65	900	850
Philco	1000	Y	$7010	6/63	16	X
	2000-210, 211	Y	$40,000	10/58	16	X
	2000-212	Y	$52,000	1/63	12	X
Radio Corporation of America	RCA 301	Y	$7000	2/61	644	2
	RCA 3301	Y	$17,000	7/64	69	5
	RCA 501	Y	$14,000	6/59	96	X
	RCA 601	Y	$35,000	11/62	5	X
	Spectra 70/15	Y	$4100	9/65	78	100
	Spectra 70/25	Y	$6700	9/65	45	55
	Spectra 70/35	Y	$10,400	7/66	18	100
	Spectra 70/45	Y	$17,400	11/65	24	95
	Spectra 70/55	Y	$40,500	1/67	0	12
Raytheon	250	Y	$1200	12/60	175	X
	440	Y	$3500	3/64	16	3
	520	Y	$3200	10/65	22	6
Scientific Control Corporation	650	Y	$500	5/66	3	7
	655	Y	$1800	10/66	0	2
	660	Y	$2000	10/65	6	2
	670	Y	$2600	5/66	1	2
Scientific Data Systems Inc.	SDS-92	Y	$1500	4/65	73	20
	SDS-910	Y	$2000	8/62	188	6
	SDS-920	Y	$2900	9/62	140	8
	SDS-925	Y	$3000	12/64	32	8
	SDS-930	Y	$3400	6/64	137	12
	SDS-940	Y	$10,000	4/66	9	9
	SDS-9300	Y	$7000	11/64	33	5
	Sigma 2	Y	$1000	12/66	2	190
	Sigma 7	Y	$12,000	12/66	2	25
Systems Engineering Labs	SEL-810/810A	Y	$1000	9/65	30	8
	SEL-840/840A	Y	$1400	11/65	4	8
UNIVAC	I & II	N	$25,000	3/51 & 11/57	24	X
	III	Y	$20,000	8/62	75	X
	File Computers	N	$15,000	8/56	16	X
	Solid-State 80 I, II, 90 I, II & Step	Y	$8000	8/58	238	X
	418	Y	$11,000	6/63	100	35
	490 Series	Y	$35,000	12/61	115	52
	1004	Y	$1900	2/63	3200	50
	1005	Y	$2400	4/66	490	200
	1050	Y	$8000	9/63	295	35
	1100 Series (except 1107, 1108)	N	$35,000	12/50	10	X
	1107	Y	$55,000	10/62	35	X
	1108	Y	$65,000	9/65	34	68
	9200	Y	$1500	6/67	0	800
	9300	Y	$3400	6/67	0	250
	LARC	Y	$135,000	5/60	2	X
				TOTALS	41,196	24,360

X = no longer in production.

* To avoid double counting, note that the Control Data 160 serves as the central processor of the NCR 310. Also, customers ordering a new computer model intended to replace a computer model in the same product line may continue to use their current peripheral equipment, which can account for 30-70% of the value of the total computer system.

STOCK MARKET REPORT ON SELECTED EDP FIRMS

January 20 - February 3, 1967

NEW YORK STOCK EXCHANGE	1966/1967 High	1966/1967 Low	Sales in 100's	2 weeks High	2 weeks Low	Last	2 weeks Net Change	2 weeks % Change
Addressograph-Multigraph	77 3/8	49 1/8	1731	55	51 1/8	54	+3/4	+1.41
American R & D	53	20 1/4	898	53	46	52 3/4	+6 3/8	+13.75
Ampex Corp	31 1/8	17	7543	31 1/8	28 1/2	29 5/8	-1/4	-0.84
Burroughs	96 3/4	49 1/4	2344	96 3/4	90 1/8	91 3/8	+2 1/4	+2.52
Collins Radio	85 3/8	37 5/8	2816	71 1/2	67 1/4	69 1/4	+2	+2.97
Control Data	48 7/8	23 5/8	7494	48 7/8	43 5/8	47 1/4	+3 3/4	+8.62
Electronic Assoc	27 1/8	12 1/4	2095	24 1/8	20 7/8	23	+2	+9.52
General Electric	120	80	2748	91 1/2	87 1/8	89 3/4	+1	+1.13
Honeywell	96	53 1/2	1954	76 3/8	70 1/2	73 3/4	+3 5/8	+5.17
IBM	406	289 1/2	1161	406	390 1/2	399	+9	+2.31
Inter Tel & Tel	82 3/4	58 1/8	1528	81 1/2	79 3/4	81 3/8	+3/4	+0.93
Litton	87 7/8	56 5/8	1592	86 7/8	82 3/4	83	-3 1/8	-3.63
Nat Cash Register	91 1/2	59	1105	79 5/8	74 5/8	77 1/2	-2 1/8	-2.67
RCA	62 1/4	36 3/4	4132	49 7/8	45 1/2	49 1/2	+2.78	+6.17
Raytheon	63 3/8	36	4007	63 3/8	57 1/4	63 1/8	+5 3/4	+10.02
Scientific Data	97 3/4	41 1/4	3750	97 3/4	86 1/2	92	+2	+2.22
SCM	91 7/8	42 1/8	7314	71 7/8	63 7/8	71 1/2	+3 7/8	+5.73
Singer	64 3/4	39 3/8	1103	54 3/4	52	54 5/8	+5/8	+1.16
Sperry Rand	33 5/8	17 1/8	11,240	31 3/4	28 7/8	30 1/8	+1/4	+0.84
Teledyne	133	50 3/8	2387	118	106 1/2	117 1/4	+10 1/2	+9.84
NYSE COMPUTER STOCK AVERAGE							+2.59	+3.86

AMERICAN STOCK EXCHANGE	1966/1967 High	1966/1967 Low	Sales in 100's	2 weeks High	2 weeks Low	Last	2 weeks Net Change	2 weeks % Change
ANelex	28	7 3/8	1124	16 5/8	13 5/8	16	+2 1/4	+16.36
Audio Devices, Inc	41 1/4	17	714	28	23 1/4	26 1/2	+2 5/8	+10.99
Bunker-Ramo	10 1/2	4 5/8	1976	9 7/8	8 1/8	9 3/8	+1	+11.94
Cal Comp	37 1/2	13 1/4	948	37 1/2	32 7/8	36 5/8	+3 7/8	+11.83
Clary	8	3 5/8	681	6 3/8	5	6 1/8	+1 1/4	+25.64
Computer Application	26 1/4	8	784	19 3/8	14 5/8	18 3/8	+3 1/4	+21.49
Computer Science	37 1/4	15 1/4	1624	35 3/4	28 1/2	33 3/4	+4 1/2	+15.52
Digital Equipment	47 1/4	27 1/4	2128	47 1/4	36 3/8	47 1/4	+11 7/8	+33.57
Leasco Data Proc Equip Corp	46 1/8	18 1/2	1062	46 1/8	37 1/4	45 3/8	+8 1/8	+21.81
Levin-Townsend Comp Corp	26 7/8	8 1/2	575	17 3/8	15 5/8	18 5/8	+1 5/8	+9.56
Milgo Electronics	8 7/8	4	172	6 3/8	5 5/8	6 1/8	---	---
Planning Research	36 1/2	12 7/8	239	26 1/2	20 5/8	25 1/8	+3 1/4	+14.86
Potter Instrument	26 3/8	9 1/8	1472	15 7/8	14	14 5/8	---	---
AMEX COMPUTER STOCK AVERAGE							+1.34	+14.89

OVER-THE-COUNTER	1966/1967 High Bid	1966/1967 Low Bid	February 3 Bid	February 3 Asked	2 weeks ago Bid
Applied Data Research, Inc	6 3/4	2 1/4	4 5/8	5	4 3/4
Aries Corp			11 1/2	12	11 1/4
Automatic Data Processing	28 1/2	21 3/4	27	27 3/4	25 3/4
Bolt, Beranek & Newman, Inc	16	7 3/8	9 3/4	10 1/4	9 3/4
C-E-I-R	15 1/4	5 3/4	9 3/8	9 7/8	8 3/8
Computer Usage	29 1/2	16 3/4	29 1/2	31	25 1/2
* Cyber-tronics	8 1/2	4	7 3/4	8 1/2	6 1/4
Data Products	4 3/8	2 1/4	4 3/8	4 5/8	3 1/2
Digitronics	12 3/4	4 3/4	7 5/8	8	7 5/8
Documentation, Inc	8 1/2	3 3/8	4 1/8	4 3/8	4
DPA, Inc	19 7/8	3 5/8	4 7/8	5 1/4	5 1/2
Electronic Memories	26	10	14 3/4	15 1/8	13 7/8
Fabri-Tek	26	5 3/4	6 1/8	6 1/2	7 3/4
G-C Computer Corp	13 1/8	8 1/4	N/A	N/A	12 7/8
Informatics, Inc	12 1/2	7 1/2	12 1/2	13 1/4	9 3/4
Management Assistance	45 3/4	11 1/4	18 1/2	18 7/8	17
Memorex	84 1/2	31 1/2	84 1/2	85 1/2	68 1/4
Mohawk Data Sciences	46	19	39 1/2	40	39 1/8
Randolph Computer Corp	25 1/4	10	27	29	18 1/2
Recognition Equipment, Inc	72	33	60	62	61 1/2
Systems Engineering Labs			N/A	N/A	11 3/8
University Computing Co			29	29 1/2	26 1/2

* New listing on this table.

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E|D|P
INDUSTRY AND MARKET REPORT

A SEMI-MONTHLY NEWSLETTER FOR EXECUTIVES IN THE ELECTRONIC DATA PROCESSING INDUSTRY, AND THE FINANCIAL COMMUNITY.

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XEROX'S FIRST COMPUTER CENTER PRODUCT IS PRINTOUT COPIER THAT SPEEDS AVAILABILITY OF OUTPUT AND REDUCES NEED FOR COSTLY MULTI-PART FORMS

It's no secret that Xerox Corp. has been eyeing the computer-related marketplace for some time. Interestingly, the reasons why the computer field has proven so troublesome for many firms are the very reasons that make it extremely attractive to Xerox. The company is reaping handsome profits (in 1966, income was up 36.1% to $79.8 million on sales of $526 million) from its office copying equipment, and it needs to enter a capital-absorbing field with delayed, but potentially attractive, profits. And scores of firms who have tried to enter the computer industry can testify that it is a business which generously absorbs capital and freely delays profits!

Xerox's first product for computer centers is a peripheral device that copies continuous fan-fold forms from the 15-inch-wide paper that comes from a computer's high-speed printer; reduces each page of output and duplicates it on standard 8½ by 11-inch paper; allows interpretative information -- such as headings, lines, or shading -- to be added during the copying operation; sorts and collates up to 10 copies (expandable, by adding additional bins, to 30) of a report, ready for binding and distribution.

This product, called the 2400-IV, is based largely on the technology of Xerox's high-speed model 2400 duplicator and both deliver 2400 pages an hour. It is not a replacement, however; it is a product engineered and designed to operate right in the computer room, speeding up and simplifying report generation. Some implications of the device are obvious, others more subtle:

- With the 2400-IV, management can request as many copies of a report as it needs. Each copy is as legible as the original, yet it is produced on letter-size paper with which the executive is familiar and which fits easily into his notebooks or briefcase. With reports more accessible, however, there is every reason to invoke one of Parkinson's Laws: There will probably be more reports.

- A company's data processing center need no longer stock tens or even hundreds of different forms, and forms ordered ahead can't grow obsolete. Operators, also, need not worry about the threading and eventual separation of multi-ply carbon sets. One product -- a single stream of white paper -- would be fed to the high-speed printer, since the 2400-IV makes all necessary copies in a personalized format that can be changed in seconds.

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- As a direct result, forms and forms equipment manufacturers may well lose business. Computer users would want only single-ply white paper for many printouts. They stand to save in forms inventory, in setup time, and in printer efficiency, since single-ply paper has several thousand sheets per box, multi-ply only several hundred. EDP I&MR estimates that the use of multi-ply stock forms may be cut by 50% to 70% at installations installing a 2400-IV.

- Much more flexibility in printer selection will be possible. To date, most users are saddled with an impact printer for making multiple carbon copies. If, as with the 2400-IV, only an original report is needed, the user can select a non-impact output device such as a low-cost or ultra-high-speed electrostatic printer.

Machine details

The desk-sized new device works very simply, with the continuous computer printout going past an optical unit and collated copies of the report, on regular 20-pound paper, stacking up in bins. The speed of the machine is compatible with that of printers found at most computer installations. Thus, working with an 800 line per minute printer, the 2400-IV would make two copies of the output as fast as it was printed. This type of on-line use is unlikely, however, as the copier is designed to operate independently. Working steadily, the 2400-IV will reproduce 400 48-page reports per shift.

At present, the 2400-IV is available only on rental, and the basic lease price is $1400 a month for the first 103,000 copies -- just over 1 1/3 cents a page. With additional use, the rate is $13.60 for each 2400, about 0.57¢ per page. As with other Xerox products, the rental agreement for this machine contains a 15-day cancellation clause. Also -- "in keeping with the computer environment in which the machine will work" -- service will be less than two hours away, Xerox executives say.

To insure this, and to overcome the bottleneck of training support personnel, Xerox purposely plans a slow introduction rate for the machine. The first delivery was to Ford Motor Co., just days before the announcement. Early deliveries will be confined to major metropolitan areas or to very large installations that justify the necessary support personnel.

Because of this cautious introduction policy, and because problems will certainly arise as customers begin to use the 2400-IV, Xerox will deliver only 30 or so machines a month to start with. By mid-year, however, production should be at three or four times this level, and some 1000 machines can easily be installed this year.

Business outlook

This move by Xerox was definitely expected, and it is only the first step into the computer-related marketplace. The company has committed itself as a manufacturer of "major systems of graphic communications" (EDP I&MR, July 30, 1964), and we think that several other products will be announced during this year. Xerox will be limited only by its ability to tool up for and train personnel to service new types of equipment.

The company is highly profitable, with the major portion of its income coming from rentals of office copiers. Production costs for the bulk of the copiers are paid, and this capital can therefore be invested into equipment for the computer user. Xerox, indeed, must branch out this way to continue its growth.

Other new products may not look as much like copiers as the 2400-IV, but they will be components for graphic systems:

- Already, with an adaptation of LDX (Long Distance Xerography), the company can convert images directly from magnetic storage to paper and back. It has the facility, therefore, to introduce information retrieval terminals.
- For some time, Xerox's British affiliate, Rank Xerox, has been offering a printer -- based on electrostatic reproduction techniques -- that outputs information from a computer at higher speeds than today's impact printers. Xerox probably won't try to offer this directly to U.S. computer centers for some time, but it may well offer it as a remote terminal that could receive reports over telephone lines, then produce a copy that the 2400-IV would duplicate.
- We anticipate the announcement, soon, of a low-cost information storage and retrieval system. Full details are not out, but EDP I&MR thinks Xerox is combining reduction and enlargement with a printing capability. Thus, we think the system will feature documents stored visually on cards that can be manipulated by present-day equipment. Information could be enlarged and printed when desired.

In the long look ahead, Xerox sees itself as serving a broad area that stops just short of the computer main frame on the one side and the communications equipment on the other. It doesn't plan to get into the computer or the communications business, but it plans to offer systems that take advantage of both in making information more accessible and useful for the person who wants it.

It's almost as if, fifty years ago, a company said that it didn't want to make power generation equipment and that it didn't want to install and manufacture electric poles and wires -- all it wanted to do was to make appliances that plug into the electric system someone else had built. Xerox probably has this vast a market in the field it has now officially entered.

HOUSE ANTITRUST SUBCOMMITTEE STARTS INDEPENDENT PROBE OF COMPUTER INDUSTRY

The House Antitrust Subcommittee will make its own investigation of "antitrust and monopoly problems" in the computer industry. This comes at a time when the Justice Department is making a "preliminary investigation" of the structure of the computer industry.

There was no official announcement of the subcommittee's action, but is was disclosed in letters recently sent to major computer manufacturers by the group's chairman, Rep. Emanuel Celler (D.- N.Y.). He said in the letter that the subcommittee wants to delineate the present structure of the U.S. computer market; to ascertain where U.S. computer manufacturers stand in the world market; and to analyze the current marketing policies that U.S. computer manufacturers use.

The letters asked for a large amount of information from the larger computer manufacturers. Wanted: estimates for the future used in making sales policies; statements, for each computer model, of company's sales policies and practices;

statistics, by model, on computers sold and leased, and backlog as of the end of 1966; financial information about operating costs, profit and loss in computer manufacturing and distribution. The letter implied that more information might be desired in the future.

The subcommittee has nothing official to say about its investigation, and computer manufacturers will do nothing except confirm or deny that they were contacted by the Celler subcommittee. Apparently only the largest computer producers received the letter: IBM, Honeywell, Control Data, and Univac have been contacted by the committee; GE has no official comment, but is understood to have the letter; NCR, RCA, Burroughs, and SDS have no knowledge of receiving the letter or any other communication from the subcommittee.

Mr. Celler's subcommittee, inevitably, will share the "IBM probe" limelight with the Justice Department. It has been some time since the group was in the headlines, and some Washington observers suggest that the great amount of press space given to rumors of Justice's computer industry investigation may have been an important catalyst in precipitating the subcommittee's action on the same subject.

We have pointed out before that the computer industry is in better shape than at any time in the past (EDP I&MR, Jan. 25, 1967). Almost every manufacturer is operating at capacity; most companies show improved profitability, reflecting a widening base of leasing customers and fattened order books. There is a growing maturity in the industry, and reports from the field indicate that IBM is feeling the competition more than ever before. Of course there are potential problems facing leasing companies and computer service organizations, but the need for legislation -- and therefore legislative investigation -- is questionable at a time when the computer industry shows impressive signs of competitive vitality and prosperity.

INTERNATIONAL NEWS:

General Electric has more computer troubles in Western Europe . . . as it and other firms make advances in East European market

General Electric's posture in the West European computer world has slumped again. In Britain there are changes within GE's newly acquired subsidiary De La Rue Bull, which was a marketing subsidiary of the French organization. GE cut the staff by 20% and put four Americans on the seven-man board of directors. This was apparently too much for the "Buy British" rear guard. Two of six 400 series machines on order in Britain have been cancelled. (One of these, however, stems from the folding of Barro Computer Systems.)

Across the Channel, the French are still raising their eyebrows. After GE dropped the French-designed Gamma 140 and 145 machines from its line (EDP I&MR, Jan. 12, 1967), it compounded the insult by laying off several hundred workers. Also, following GE's virtual withdrawal of the 600 series from all but the U.S. market, both the French Meteorological Service and Electricite de France have officially cancelled their plans to use the 600 equipment. Prior to the recent elections there were rumblings about nationalizing Bull-GE, but nobody presently seems to be taking them seriously.

On another front, however, things are looking up. GE has entered the heretofore largely untouched Communist Bloc market. Olivetti-GE has orders for a 115

and a 415 from a Soviet automotive company. Three other machines are on order from Russian customers, also, and the total value of the data processing systems is estimated at $2.4 million. These orders, which stem from Olivetti-GE's participation last year in an office machines fair in Moscow, reflect the more liberal U.S. policy on export licenses to Iron Curtain lands.

There is now an "official relaxation" on computer shipments by U.S. companies to Eastern Europe, the Department of Commerce reports, but export licenses are still handled on an individual basis. No longer, however, are all "third generation" machines de facto restricted. For example, IBM has a 360/20 cleared for delivery to Hungary, and it reportedly has an extra-large staff in Vienna looking for more business.

This development may hurt British sales to Eastern Europe. Firms from Britain, plus Fujitsu of Japan, have had a substantial portion of this business because technical licensing restrictions from the U.S. have kept others out. Now, U.S. firms themselves -- plus English Electric-Leo-Marconi and the five Japanese computer manufacturers who operate in conjunction with U.S. companies -- can look to Eastern Europe as a new market. Already, EELM has been granted export privileges to Czechoslovakia for one of its System 4 Model 50 machines, a computer based on RCA's Spectra 70.

This market is small, but growing. Our records show that about 80 of the 300 computers installed in Eastern Europe are of Western manufacture: Elliott of Britain is the leading supplier, with 38 systems; 13 Univac 1004's are installed; International Computers and Tabulators has sold ten of its 1900 series systems, primarily to the statistical offices of various governments; EELM and Fujitsu each have six computers operating behind the Iron Curtain.

From all reports, the market for computers in Eastern Europe is expanding, and so is its computer industry. Apparently, however, its own industry will not be able to supply the quantity or the variety of machines that will be necessary during the next few years. Elwro Works, in Poland, is developing a newer and faster model of its Odra series, but it is not expected to meet demands; also, the Minsk machines from Russia are not considered fast enough. It seems, therefore, that Western and Japanese firms have an expanding opportunity in Eastern Europe. . .provided the U.S. Government's export control policy remains the same or loosens further.

GENERAL ELECTRIC TURNS TO INDUSTRY MARKETING WITH BANKING AS PRIME TARGET

Several highlights of GE's "retrenchment" strategy in the computer business are beginning to appear. To build a strong customer base for the '70's, GE is adopting the "Industry" route found so successful by other manufacturers, and is strengthening its industry marketing capabilities. For now, it has focussed particularly on banking, an area where GE has long held a strong, if not predominant, position. Naturally, GE will emphasize the upgrading of present customers, but it will seek new business primarily from firms planning for their first computer. In so doing, it will avoid expensive direct confrontation in attempting to replace currently installed computers made by other manufacturers, particularly IBM.

For small users, GE is stressing a beefed-up version of the 115, introduced in 1965 as a satellite system for larger GE computers. It has larger, faster core capability, a 12K tape COBOL, CDC disks, and a yet-to-be announced disk COBOL (to be supplied by Olivetti-GE, as is most of the system and its software).

INTERNAL REVENUE SERVICE PUTS ALL TAX RETURNS ON COMPUTERS;
AS SYSTEM GOES INTO EFFECT, IRS LOOKS FOR WAYS TO CUT INPUT BOTTLENECK

> "Every single business and individual income tax return filed this year will be part of an integrated, computer-based tax system. This is a first, not just for our country but an achievement unparalled in the history of tax administration."
>
> -- Sheldon S. Cohen, Commissioner of Internal Revenue, at data processing center dedication, Andover, Mass.

It is indeed a fact. Every individual and business tax return in the country is now going onto a massive computer file, and there's no way to escape cognizance: The only way a person can now avoid paying income tax, the Internal Revenue Service asserts, is not to make any income.

The system for allowing this has been in the works for five years, and some regions of the country have been under its spell for several years. This year, though, for the first time, all reports to IRS have been brought together in what it calls "the largest and most complex integrated data processing system used for non-military purposes." Flatly, says IRS, "this year all federal tax returns in the country will be subject to /the system's/ careful scrutiny."

The system

When an individual, or a business, files its income tax return, he starts a process that leads to what the IRS calls its Master File. This is really in two parts -- a Business Master File (BMF) and an Individual Master File (IMF). This file -- the current part of which is contained on some 700 reels of magnetic tape in the National Computer Center in Martinsburg, West Virginia -- contains a record of every income tax return, and every income tax payment, made in the country during the past three years. At present, there are 6 million entries in the BMF and 72 million in the IMF.

Returns go first to one of seven regional data processing centers, where they are examined for completeness, marked for identification, and given to key punch operators. Each center has two or three Honeywell 200 computers (the system uses 17 in all) which check all arithmetic on the returns and convert the information from punched cards to magnetic tape. This process is called "perfecting" the returns. Any mistakes -- made by taxpayer or keypuncher -- are caught and corrected and then the computationally correct information is sent to NCC for processing.

Once each week, the Master File at Martinsburg is passed through the large computer complex consisting of two IBM 7074's and two IBM 360/65's. Information from regional centers updates each taxpayer's central account, which includes: his permanent tax number, a continuously updated multiple-year digest of tax data about his account, data on all returns for which the taxpayer is liable, when and where returns have been filed, the amount and status of each liability, and any audit results.

The NCC, as output, produces magnetic tape reports that disclose who failed to file returns, owes taxes for previous years, has refunds coming, or filed duplicate claims for refunds. Spotlighted are returns that have discrepancies or unusual characteristics that would suggest further examination. Refund tapes go to Treasury payment offices, others are sent to regional centers where they are used to prepare tax bills or delinquency notices and to identify returns that are to be considered for audit.

Economics of the system

The system, says IRS, is the only practical way to cope with its steadily growing mountain of paperwork. It saves money several ways:

- The number of people needed to process each return has been reduced. In the 1930's, there was one IRS employee for each 500 returns; today, there is one employee for each 2000 returns.
- Everyone is forced to file. Last year, with the system not fully operational, IRS uncovered 800,000 delinquent returns that brought in an extra $171 million in revenue. At the same time, however, it did give taxpayers credit for $58 million in refunds they had missed.
- Consolidated accounting helps both IRS and taxpayers. A refund isn't issued an individual or business if another tax liability offsets it. On the other hand, uncollected refunds are credited to the taxpayer's account. And since each taxpayer has a permanent identification number, this amount will be credited the next time he files.

The system is still evolving. One big bottleneck at present is the large staff of keypunch operators required to enter data into the system. At Andover, Mass., where IRS processes about 25% of the nation's total taxes, over 1000 operators are required to punch cards. But IRS is working to solve this problem.

In its Atlanta service center this year it is testing a system, developed by General Electric, to replace the card punching and verifying system. Equipment in use consists of a GE 4060 process control computer, disk and magnetic tape storage units, and GE Datanet 760 visual display terminals. Information is keyed on the terminals, and operators can visually verify its accuracy. If this operation is successful, similar systems may be installed in all seven regional centers.

Undoubtedly this complex system will continue to grow. And though IRS says it "has not permitted the machine to intimidate or dominate the individual," we wonder if we are now justified in referring to an additional tax assessment as getting the "byte" from the IRS.

FCC SATISFIED WITH GUIDELINES FOR INQUIRY, SETS FALL DATE FOR REPLIES

The Federal Communications Commission's inquiry into the interrelationships between computers and communications (EDP I&MR, Nov. 15, 1966) has moved another step forward. After receiving replies from about 40 interested parties -- associations, computer manufacturers, software firms, leasing companies, railroads, suppliers, and the Justice Department among others -- the FCC has decided that its original notice adequately describes the problems to be examined. Therefore, it has invited all interested parties to submit written responses to this by October 2, 1967.

In its supplemental notice, the FCC discusses the specifics raised by some of the respondents, but in almost every case it concluded that the original notice was "sufficiently broad and encompassing" to cover the subject. Indeed, IBM -- already being questioned by other groups within the Government -- suggested a restrictive interpretation: One item, it suggested, should not request "the basis for and structure of charges for computers for data processing services generally . . .but only. . .charges for communication channels and facilities required for data processing applications." FCC says it can't understand the problem "by focussing upon the latter to the exclusion of the former." It wants to know the structure of "any and all charges" related to furnishing computer services it is studying.

STOCK MARKET REPORT ON SELECTED EDP FIRMS

February 6 - 17, 1967

	1966/67 High	1966/67 Low	2 weeks Sales in 100's	High	Low	Last	2 weeks Net Change	2 weeks % Change
NEW YORK STOCK EXCHANGE								
Addressograph-Multigraph	77 3/8	49 1/8	2728	59 1/4	53 3/4	54 3/4	+3/4	+1.37
American R & D	61 3/4	20 1/4	831	61 3/4	53	60 3/4	+8	+15.17
Ampex Corp	32 1/8	17	6739	32 1/8	28 7/8	30	+3/8	+1.27
Burroughs	97 7/8	49 1/4	2664	97 7/8	87 1/2	96 1/4	+4 7/8	+5.33
Collins Radio	85 3/8	37 5/8	1892	72	67 1/8	71 5/8	+2 3/8	+3.43
Control Data	50	23 5/8	6111	50	43 5/8	49	+1 3/4	+3.70
Electronic Assoc'	27 1/8	12 1/4	1107	24	21 5/8	21 7/8	-1 1/8	-4.89
General Electric	120	80	2993	90 3/8	84 3/4	84 7/8	-4 7/8	-5.43
Honeywell	96	53 1/2	1743	79 5/8	72 3/4	77 3/4	+4	+5.42
IBM	435 1/4	289 1/2	779	435 1/4	413	424 5/8	+25 5/8	+6.42
Inter Tel & Tel	84 5/8	58 1/8	1161	84 5/8	81 1/2	83	+1 5/8	+2.00
Litton	94 3/4	56 5/8	2443	94 3/4	82 3/8	92 1/8	+9 1/8	+10.99
Nat Cash Register	91 1/2	59	3624	83 7/8	76 1/4	82 1/2	+5	+6.45
RCA	62 1/2	36 3/4	4160	51 3/8	47	47 1/4	-2 1/4	-4.45
Raytheon	64 1/2	36	2380	64 1/2	60	61 3/4	-1 3/8	-2.18
Sanders	72 5/8	36 1/2	655	69 5/8	63 3/4	66 1/4	-2 3/4	-3.98
Scientific Data	97 3/4	41 1/4	1656	94	81 1/2	84 1/2	-7 1/2	-8.15
SCM	91 7/8	42 1/8	4891	74 1/4	68 5/8	73 7/8	+2 3/8	+3.32
Singer	64 3/4	39 3/8	751	56 1/4	54 7/8	56 1/8	+1 1/2	+2.74
Sperry Rand	33 5/8	17 1/8	9444	32 5/8	29 3/8	32 3/8	+2 1/4	+7.47
Teledyne	133	50 3/8	1454	124	113 3/4	118 3/4	+1 1/2	+1.28
NYSE COMPUTER STOCK AVERAGE							+2.44	+2.25
AMERICAN STOCK EXCHANGE								
ANelex	28	7 3/4	438	17 1/8	15 1/2	16 1/8	+1/8	+.78
Audio Devices, Inc.	41 1/4	17	442	27 3/4	25 1/8	27 1/8	+5/8	+2.36
Bunker-Ramo	10 1/2	4 5/8	777	9 3/8	8 1/2	8 7/8	-1/2	-5.33
Cal Comp	41 1/2	13 1/4	681	41 1/2	34 1/4	41 1/4	+4 5/8	+1.26
Clary	8	3 5/8	275	6 1/4	5 3/4	5 3/4	-3/8	-6.12
Computer Application	26 1/4	8	332	19 1/8	16 7/8	17	-1 3/8	-7.48
Computer Science	37 1/4	15 1/4	1191	35 5/8	30 3/8	33 1/4	-1/2	-1.48
Digital Equipment	51 1/2	27 1/4	886	51 1/4	45 3/8	51 1/4	+4	+8.47
Leasco Data Proc Equip Corp	51 3/8	18 1/2	850	51 3/8	44 3/4	49 1/2	+4 1/8	+9.09
Levin-Townsend Comp Corp	26 7/8	8 1/2	444	21 7/8	18 5/8	20 1/2	+1 7/8	+10.07
Milgo Electronics	8 7/8	4	402	7 3/4	6 1/4	7 1/4	+1 1/8	+18.36
Planning Research	36 1/2	12 7/8	256	27 5/8	24	26	+7/8	+3.48
Potter Instrument	26 3/8	9 1/8	1976	17 5/8	14 3/8	17	+2 3/8	+16.24
AMEX COMPUTER STOCK AVERAGE							+1.31	+3.82

	1966/67 High Bid	1966/67 Low Bid	February 17 Bid	February 17 Asked	2 weeks ago Bid
OVER-THE COUNTER					
Applied Data Research, Inc	6 3/4	2 1/4	4 1/8	4 1/2	4 5/8
Aries Corp			11 1/8	11 5/8	11 1/2
Automatic Data Processing	29 1/4	21 3/4	28 1/2	29 1/2	27
Bolt, Beranek & Newman, Inc	16	7 3/8	12 1/2	13	9 3/4
C-E-I-R	15 1/4	5 3/4	10 1/2	10 3/4	9 3/8
Computer Usage	34 1/2	16 3/4	32 1/2	34 1/4	29 1/2
Cyber-tronics	8 1/2	4	7 3/4	8 1/4	7 3/4
Documentation, Inc	8 1/2	3 3/8	6 1/4	6 5/8	4 1/8
DPA, Inc	19 7/8	3 5/8	6 1/8	6 1/2	4 7/8
Electronic Memories	26	10	17	17 1/2	14 3/4
Fabri-Tek	26	5 3/4	8 5/8	9	6 1/8
G-C Computer	17	8 1/4	16 3/4	17 1/4	14 3/4
Informatics, Inc	13 1/2	7 1/2	13 1/4	14	12 1/2
Management Assistance	45 3/4	11 1/4	18 1/4	18 7/8	18 1/2
Memorex	88	31 1/2	88	89	84 1/2
Mohawk Data Sciences	49 1/4	19	49 1/4	50	39 1/2
Randolph Computer Corp	33 1/2	10	33 1/2	35	27
Recognition Equipment, Inc	72 1/2	33	69 1/2	71 1/2	60
Standard Computers			11 1/4	11 3/4	
Systems Engineering Labs			14 3/4	14 3/4	12 3/4
University Computing Co			30 3/4	31 1/2	29

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E|D|P
INDUSTRY AND MARKET REPORT

A SEMI-MONTHLY NEWSLETTER FOR EXECUTIVES IN THE ELECTRONIC DATA PROCESSING INDUSTRY, AND THE FINANCIAL COMMUNITY.

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Telephone 617/332-8840

"Year that was. . ."

COMPUTER INDUSTRY REVIEW AND FORECAST

1966 proved to be a year of contrasts in the computer industry. It was a year of accelerated prosperity for most, a year of critical realignment for some. Among the highlights were:

- A dramatic 52.5% increase in the gross value of computer equipment delivered to new and current customers: Shipments spurted to $3.66 billion from $2.4 billion in 1965. This, the highest percentage increase in shipments during the last five years, was just barely exceeded by the 52.8% growth achieved between 1960 and 1961 when shipments rose from $720 million to $1100 million.

- The market life of second generation computers expanded substantially and, at least for the user, unexpectedly. A recent survey by EDP I&MR indicates that 30% of the computer customers who have third generation computers installed have continued to use their second generation computers originally designated for replacement from six to twenty-four months longer than expected. The reasons for this are:

  a. Disappointing levels of software efficiency on third generation systems.
  b. Shortage of skilled systems analysis and programming personnel to conduct the reprogramming and conversion process.
  c. Underestimation of the computer time and hardware required for new applications.

- Leasing companies are getting considerably greater attention. A study made recently by our staff indicated that approximately 6% of current computer customers lease all or part of their data processing equipment from a leasing company. However, 40% of people with computers on order said that they will give serious attention to the possibility of leasing their next computer.

- Large-scale computers continued to give the industry headaches. Conspicuous performance slips last year were almost universal in this area. Finally, IBM has officially closed the order books on the 360/90 series, and the 360/67 time-sharing system is being marketed on a restricted basis only. Performance of the Mod 67 is currently

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achieving only one-tenth of expectations. Apparently, the industry has again neglected the system complexity equation: System software for a computer handling X^2 as many separate programs (or users) is generally X times more difficult and expensive to design and implement.

Outlook for the Year that Is

During 1967, we expect another substantial increase in the value of computer equipment shipped, albeit not as large as achieved in '67. Shipments for 1967 should reach $4.3 billion, an increase of 17.5% over 1966. For the industry, our expectations are that 1967 will prove to be:

- The year that the rented second generation computers continue to sustain their market lives, producing for their manufacturers unanticipated and highly profitable additional revenue. Many customers, in fact, are now willing to purchase such equipment, or to sign long-term leases that insure the vendor his return on investment. Thus -- with continued high order levels for computers that were initially scheduled for phasing out earlier than customer demand required -- several manufacturers may have their production plans for new equipment disrupted.

- The year in which buffs of the "total computer utility" will admit that this concept is many years away. Limited and special-purpose systems will continue to be installed, and will see wider and wider use. But the true large-scale general-purpose time-sharing systems will gestate in the ivory towers for at least half a decade. They will, however, rise again like a phoenix (no pun intended), more mature and viable, with the birth of a new computer generation.

- The year in which small computers become a more important market factor in the industry. The richest unsaturated potential in the computer market is in the small-scale area. New low-cost data collection and conversion equipment will let the small user more readily hurtle the cost threshold for getting his business data set up for a computer.

Expectations for leading EDP manufacturers in 1967

Burroughs has a headstart and high hopes for the $100 million Air Force order that could require over 100 of its B2500/3500 systems. Software for the latter is under control. Also, the B5500/6500 line is getting favored attention in many large computer acquisitions. The B8500, however, is likely to fall into the supercomputer syndrome and be a conspicuous disappointment.

Control Data enjoys growing success as an OEM equipment supplier, selling peripherals to competitors. The hottest item will be disk pack drives which it sells to Honeywell, GE, RCA, etc. Increasing emphasis will be put on communications and process control systems. It will de-emphasize small- and medium-scale computers, particularly those with a tinge of business applications.

Digital Equipment continues to do well in the small digital processor market, with both OEM and scientific sales. It does face growing competition, however, from many new firms entering the field. Also, its venture into medium-scale computers, via the PDP-10, is likely to have limited effectiveness because the company lacks a systems support task force.

General Electric will take a holding action stance. It will emphasize the sale of small computers, particularly its 115, and hopes to clear up large computer problems by yearend. The fate of the 645, however, looks dim. Emphasis on large computers will shift toward a computing service business with remote terminals rented to clients.

Honeywell appears in a good market position for the next three years, and is strong in the running for the Air Force contract. It starts small customers off with a small tape or card system, then can upgrade them within the 200 computer family for three to seven years. The question mark is its next generation of equipment. It is unlikely that IBM will again have the software incompatibilities between its current and future line that gave Honeywell a substantial market opportunity for its 200's.

IBM enjoys a strong, loyal customer base. It has the best systems support and marketing task force in the business. It will be a major beneficiary of the increased revenues from continued use of second generation systems. Also, IBM can be expected to derive attractive tax benefits from shipment of first and second generation computers to underdeveloped countries that currently do not provide a market for computers. Such equipment, however, will build a base for future sales.

NCR offers a good example of how the continuing success of a current product line delays a new product introduction. The NCR 315 system is still drawing impressive order levels, and introduction of the new 615 line has been delayed until midsummer. . . or until current ordering activity levels off.

RCA's EDP Division is still going slowly and cautiously. Spectra 70 is achieving good order levels considering an unaggressive marketing effort. The company apparently is seeking a secure base from which to launch a new generation of "software-in-hardware" microelectronic computers in the 70's.

Scientific Data Systems will benefit from the difficulties that large time-sharing computer systems have had. When super-scale computers fail to fill the time-sharing bill, there may well be multiple orders for small scientific computers such as those offered by SDS. Also, its small time-sharing computer, the 940, is working well and is highly regarded.

UNIVAC enjoys an attractive base of user experience with real-time computer systems. The 418 and 490 series are doing well. And the 1108 is picking up a handsome share of the large computer order droppings after troubles with the CDC 6600's, GE 600's, and IBM 360/67's. Sales of the 9200/9300 are handicapped by the high sales cost/low profit margin ratios, and the company is selling these machines mostly to multiple system customers, particularly the Federal Government.

A HISTORY, PROJECTION, AND ANALYSIS OF THE COMPUTER INDUSTRY THROUGH 1975

We have recently updated our continuing computer industry study that measures the past, current, and expected annual sizes of the five principal sectors of the industry. These five principal sectors are 1) General-purpose digital computers, 2) Special-purpose system computers (analog and digital), 3) Independent peripheral equipment, 4) Programming specialists, service bureaus, and consulting services, and 5) Data processing supplies and supporting services. Manufacturers in the prime sector are discussed above; on the next page we discuss the other four sectors and list a selection of firms participating in each.

Special-purpose system computers (analog and digital) includes leading manufacturers of analog and digital computers generally used in special-purpose systems. Analog computers are included in this category because their use is usually concentrated in specific problem areas, e.g. simulation of dynamic systems.

Adage	Conductron	Milgo Electronic
Applied Dynamics	Data Machines	Raytheon
Astrodata	Digital Equipment	Reeves Instrument
Beckman Instruments	Electronic Associates	Scientific Control Corp.
Bunker-Ramo	EMR Computer Div.	System Engineering Labs
Collins Radio	Foxboro	Teledyne
Computer Products		

Peripheral equipment includes leading manufacturers of peripheral equipment used with computers. Examples are paper tape handling equipment, magnetic tape transports, mass storage units, high-speed printers, graphic displays, data transmission units, etc. Core memories are also included in this category.

Addressograph-Multigraph	Digitronics	Mohawk Data Services
American Tel. & Tel.	Electronic Memories	Olivetti Underwood
Ampex	Fabri-Tek	Potter Instrument
ANelex	Ferroxcube	Rheem Electronics
Benson-Lehner	Friden (Singer Co.)	Royal Typewriter
Bryant Computer Products	General Precision	Sanders Associates
Calif. Computer Products	Gianinni Controls	SCM
Calma Corporation	Hewlett-Packard	Stromberg-Carlson
Consolidated Electro.	Indiana General	Systron-Donner
Cybetronics	Information Displays	Teletype
Data Disk	Litton Industries	Tally Corp.
Data Equipment	Lockheed Electronics	UGC Instruments

Programming specialists, service bureaus, and consulting services includes firms supplying programming services or software to computer manufacturers and users, and firms supplying computer services on a contract or service bureau basis. Also includes firms offering consulting services in the selection, implementation and/or use of computers and data processing equipment.

Aries Corp.	Brandon Applied Systems	Diebold Group
Auerbach Corp.	C-E-I-R	Digitek
Automatic Data Process.	Charles Adams Assoc.	Informatics
Arthur Anderson	Computer Applications	Planning Research
Applied Data Research	Computer Sciences	System Development Corp.
Bolt, Beranek and Newman	Computer Usage	URS Corp.
Booz, Allen & Hamilton	Comress	

Data processing supplies and supporting services includes firms selling expendable data processing supplies such as paper tape, punched cards, magnetic tape, business forms, etc. Also includes related supporting activities conducted by personnel services, magazine and textbook publishers, leasing firms, etc.

Audio Devices	Forms, Inc.	Moore Business Forms
Business Supplies Corp.	Leasco D.P. Equip	Randolph Computer
Computron	Management Assistance	Standard Computer
Cyber-Tronics	Memorex	Standard Register
DPA, Inc.	3M	Uarco

TABLE I ESTIMATED AND PROJECTED ANNUAL VALUE OF COMPUTER EQUIPMENT SHIPPED BY AMERICAN MANUFACTURERS AND THE ANNUAL SIZE OF THE RELATED PERIPHERAL EQUIPMENT, SOFTWARE, AND SERVICES MARKET

(Values in $Millions; Equipment values calculated as purchase price of systems when shipped)

Year	General Purpose Digital Computers	Special Purpose System Computers	Independent* Peripheral Equipment	Software, Service Bureaus, Consultants	Supplies and Supporting Services	Total
1955	$ 75	$ 80	$ 14	$ 15	$ 155	$ 339
1956	140	210	25	20	175	570
1957	240	350	35	25	195	845
1958	460	450	50	40	230	1230
1959	600	650	75	90	270	1685
1960	720	900	105	125	375	2225
1961	1100	1100	110	180	500	2990
1962	1400	1300	130	220	550	3600
1963	1800	1300	145	270	630	4145
1964	2200	1200	170	320	680	4570
1965	2400	1250	175	425	730	4880
1966	3660	1400	185	510	840	6595
1967	4200-4400	1500-1540	195-210	550-570	950- 970	7395- 7690
1968	4700-5100	1700-1850	210-240	600-620	1070-1130	8280- 8940
1969	5200-5800	1800-2050	250-290	640-670	1170-1270	9060- 9880
1970	5700-6400	1900-2250	315-380	690-720	1240-1370	9835-11,120
1975	$11,800-13,000+		960-1200	870-1000	1300-1650	14,900-17,000

* Part of this equipment is sold to computer manufacturers.

\+ Distinction between general- and special-purpose equipment expected to disappear by 1975.

DISCUSSION OF COMPUTER INDUSTRY TRENDS THROUGH 1975

The results of our updated study are shown in Tables I-IV. Table I contains our estimates of the annual market sizes of the five principal sectors of the computer industry between 1955 and 1966, and our projections of the annual market size of each between 1967 and 1975. In Table II, we show the estimated and expected number of computer systems shipped each year by American-based computer manufacturers. The value of these shipments is repeated for convenience. For each year in the study we have presented our estimate of the net cumulative number and value of American-made systems installed throughout the world. Also, to emphasize the changing character of the computer marketplace, we have indicated the number of customer sites at which these computers are used. In Tables III and IV we have broken down the information from Table II into its domestic and foreign segments. The differences in the two illustrate the changing character of the two markets.

Among the long-range developments suggested by the figures in these tables -- and from our research in preparing them -- are the following:

1. Shipments of digital computer equipment will increase yearly, but the rate of increase in the value of shipments will slack off in the late 1960's. Shipments for 1966 and 1967 consist primarily of new computer systems . . . in the 1968 to 1970 period, however, the larger share of equipment shipped will be add-on input/output, mass memory, and remote terminal equipment for installed systems. The average compounded growth rate between now and 1970 will be in the 13% to 15% range for computer equipment. In the early 1970's we expect the next generation of equipment to be in full production; the computer market will be more mature, however, and should grow at a 8% to 12% rate during this period.

2. By 1975, or a few years thereafter, the distinction between general purpose and special purpose equipment should disappear. By then, large-scale integration of micro-circuits and batch fabrication techniques will make miniaturized special language and/or application processors readily available, on a "plug-in" basis, within general purpose computers. Indeed, by this time most "computers" will also be terminals of some sort, with all but the largest processors able to communicate with larger machines. Massive memory banks of specialized data will be available for common access from almost anywhere.

3. Even sooner -- probably by the end of this decade -- the growth rate of the independent peripheral equipment market will greatly accelerate. Such low-cost devices as data collection equipment, display terminals, communications equipment, etc. will effectively bridge the gap between off-line data transcription and on-line computer input. A direct user market for this equipment will be available, since the interface to the computer system will be by telephone lines, private wire, etc. and not be direct cable.

4. Business for software consultants and service bureaus will experience a dampened growth rate during the last years of this decade because (a) more installations, under single-fee rental arrangements with their system supplier, will have rentable excess machine capacity; and (b) the computer manufacturers' heavy investment in application packages will lessen the user's dependence on specific help from outside. Consulting firms that enter the software-for-sale market, however, should pick up much of this outside business by selling prepackaged routines (EDP I&MR, Mar. 15, 1967), both to users and to computer manufacturers.

TABLE II WORLDWIDE ANALYSIS OF GENERAL-PURPOSE DIGITAL COMPUTERS MADE BY U.S. FIRMS
(Values, in $Millions, calculated as purchase price of systems when shipped)

Year	No. of Systems Shipped	Cumulative Net Systems Installed (Yearend)	Value of Computer Equipment Shipped	Cumulative Net Value Installed (Yearend)	Cumulative Customer Installation Sites (Yearend)
1955	150	250	$ 65	$ 180	190
1956	600	800	170	340	575
1957	1000	1700	280	600	1100
1958	1400	2950	$ 460	$ 1035	1900
1959	1700	4500	600	1600	2900
1960	2200	6500	720	2265	4000
1961	3400	9300	$ 1100	$ 3265	5400
1962	4500	12,600	1400	4515	7400
1963	5600	16,800	1710	5975	9600
1964	7500	24,000	$ 2200	$ 7925	14,000
1965	7400	31,000	2400	10,100	17,000
1966	10,200	40,600	3660	13,500	22,000
1967	13,000-15,000	51,000-53,000	$ 4200-4400	$17,000-18,000	27,000-29,000
1968	15,000-17,000	63,000-67,000	4700-5100	21,000-23,000	33,000-36,000
1969	17,000-19,000	77,000-82,000	5200-5800	25,000-28,000	38,000-42,000
1970	17,000-20,000	90,000-96,000	$ 5700-6400	$29,000-33,000	45,000-49,000
1975	22,000-25,000	150,000-170,000	$11,800-13,000	$80,000-90,000	65,000-75,000

5. The supplies and services market, while maintaining its current growth rate for the remainder of this decade, should prepare for a slackened growth rate as the decade of the 1970's begins. Low-cost data input and collection terminals will reduce the need for preparing data on punched cards or paper tape; optical character recognition will eliminate intermediate forms between source document and computer; and display devices and printout copiers will reduce some of the demand for stock paper forms.

6. During the late 1960's and early 1970's we expect that a number of used second-generation computers, traded in by U.S. users, will be shipped to customers outside the U.S. Most likely recipients of these older computers are countries

TABLE III GENERAL-PURPOSE DIGITAL COMPUTERS, MADE BY U.S. FIRMS, INSTALLED WITHIN THE U.S.*
(Values, in $Millions, calculated as purchase price of systems when shipped)

Year	No. of Systems Shipped	Cumulative Net Systems Installed (Yearend)	Value of Computer Equipment Shipped	Cumulative Net Value Installed (Yearend)	Cumulative Customer Installation Sites (Yearend)
1955	145	244	$ 63	$ 177	185
1956	550	746	156	324	533
1957	850	1500	240	547	930
1958	1180	2550	$ 395	$ 923	1575
1959	1395	3810	495	1390	2380
1960	1790	5400	590	1937	3210
1961	2700	7550	$ 880	$ 2715	4195
1962	3470	9900	1090	3620	5590
1963	4200	12,850	1300	4720	7050
1964	5600	18,200	$ 1670	$ 6105	9875
1965	5350	23,200	1770	7655	12,275
1966	7250	29,800	2640	10,030	15,650
1967	9,000-10,500	36,000-37,500	$2900-3025	$12,150-12,800	18,430-20,150
1968	9,800-11,200	42,500-45,500	3100-3350	14,385-15,750	21,500-24,000
1969	10,300-11,500	49,500-52,500	3200-3550	16,200-18,140	22,700-25,600
1970	9,600-11,500	54,200-57,800	$3300-3700	$17,630-20,060	25,700-28,400
1975	10,500-12,000	75,000-85,000	$5300-5800	$44,000-50,000	29,300-34,500

*Only a few computers installed in the U.S. were made by foreign firms.

not offering a prime market for computers today . . . namely, the economically underdeveloped lands. Discount sales will stimulate the development of trained computer technicians in these areas. Thus, when an improved economy and/or foreign aid grants allow the purchase of more modern computers, these countries will be able to use them. An example of this is Honeywell's sale last year of some ten H-400 computers to India at slightly less than half list price.

7. In the U.S., the number of computer customers will grow more slowly than the value of computers installed . . . reflecting the trend toward centralized computer centers and large computers supported by several on-site satellite computers.

TABLE IV GENERAL-PURPOSE DIGITAL COMPUTERS, MADE BY U.S. FIRMS, INSTALLED OUTSIDE THE U.S.
(Values, in $Millions, calculated as purchase price of systems when shipped)

Year	No. of Systems Shipped	Cumulative* Net Systems Installed (Yearend)	Value of Computer Equipment Shipped	Cumulative* Net Value Installed (Yearend)	Cumulative Customer Installation Sites (Yearend)
1955	5	6	$ 2	$ 3	5
1956	50	54	14	16	42
1957	150	200	40	53	170
1958	220	400	$ 65	$ 112	325
1959	305	690	105	210	520
1960	410	1100	130	328	790
1961	700	1750	$ 220	$ 550	1205
1962	1030	2700	310	895	1810
1963	1400	3950	410	1255	2550
1964	1900	5800	$ 530	$ 1820	3625
1965	2050	7800	630	2445	4725
1966	2950	10,800	1020	3470	6350
1967	4000-4500	15,000-15,500	$1300-1375	$ 4850-5100	8570-8850
1968	5200-5800	20,500-21,500	1600-1750	6615-7250	11,500-12,000
1969	6700-7500	27,500-29,500	2000-2250	8800-9860	15,300-16,400
1970	7400-8500	35,800-38,200	$2400-2700	$11,370-12,940	19,300-20,600
1975	11,500-13,000	75,000-85,000	$6500-7200	$36,000-40,000	35,700-40,500

*Takes into account expected shipments of some used computers from U.S. installations to foreign customers during the late 1960's and the early 1970's.

In fact, by 1975 we expect that there will be an average of over 2.5 computer systems per customer site in the U.S. (The average computer equipment value per installation will be $1.44 million.)

8. By 1973, the International Market will equal the U.S. market in annual shipments. It will also equal the U.S. market in number of customers by that date but will lag behind in the total value of computers installed . . . reflecting the broader base of users for small computer systems internationally. The value of computers made by U.S.-owned companies installed outside the U.S. should equal the total installed in the U.S. by 1977.

MONTHLY COMPUTER CENSUS

The number of electronic digital computers installed or in production at any one time has been increasing at a bewildering pace in the past several years. New vendors have come into the market, and familiar machines have gone out of production. Some machines have been received with open arms by users -- others have been given the cold shoulder.

To aid readers of the EDP I&MR in keeping with this mushrooming activity, we compile and publish this monthly report on the number of general purpose electronic computers made by American-based companies which are installed or on order as of the preceding month. These figures included installations and orders outside the United States. We update this computer census monthly, so that it will serve as a "box score" of progress in following the growth of the American computer industry, and of the computing power it builds.

In general, manufacturers in the computer field do not officially release installation and on order figures. The figures in this table are developed through a continuing market survey conducted by our research staff. This market research program develops a documented data file on over 80% of the computer installations in the United States. A similar program is conducted for overseas installations.

Comments on this census from informed readers will be welcomed.

AS OF FEBRUARY 10, 1967

NAME OF MANUFACTURER	NAME OF COMPUTER	SOLID STATE?	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS	NUMBER OF UNFILLED ORDERS
Advanced Scientific Instruments	ASI 210	Y	$3850	4/62	26	0
	ASI 2100	Y	$4200	12/63	7	0
	ADVANCE 6020	Y	$4400	4/65	13	17
	ADVANCE 6040	Y	$5600	7/65	8	10
	ADVANCE 6050	Y	$9000	2/66	6	6
	ADVANCE 6070	Y	$15,000	10/65	5	6
	ADVANCE 6130	Y	$1000	2/67	0	8
Autonetics	RECOMP II	Y	$2495	11/58	35	X
	RECOMP III	Y	$1495	6/61	7	X
Bunker-Ramo Corp.	BR-130	Y	$2000	10/61	160	2
	BR-133	Y	$2400	5/64	30	38
	BR-230	Y	$2680	8/63	15	X
	BR-300	Y	$3000	3/59	35	X
	BR-330	Y	$4000	12/60	30	X
	BR-340	Y	$7000	12/63	20	X
Burroughs	205	N	$4600	1/54	41	X
	220	N	$14,000	10/58	33	X
	E101-103	N	$875	1/56	121	X
	B100	Y	$2800	8/64	174	10
	B250	Y	$4200	11/61	84	1
	B260, 263	Y	$3750	11/62	230	2
	B270, 273	Y	$7000	7/62	165	2
	B280, 283	Y	$6500	7/62	129	4
	B300	Y	$10,000	7/65	135	75
	B2500	Y	$5000	2/67	1	50
	B3500	Y	$14,000	5/67	0	35
	B5500	Y	$22,000	3/63	61	10
	B6500	Y	$33,000	2/68	0	11
	B8500	Y	$200,000	2/67	0	3
Control Data Corporation	G-15	N	$1600	7/55	294	X
	G-20	Y	$15,500	4/61	25	X
	LGP-21	Y	$725	12/62	160	X
	LGP-30	semi	$1300	9/56	136	X
	RPC-4000	Y	$1875	1/61	64	X
	160*/160A/160G	Y	$2100/$5000/$12,000	5/60;7/61;3/64	462	1
	924/924A	Y	$11,000	8/61	29	X
	1604/1604A	Y	$45,000	1/60	59	X
	1700	Y	$3500	5/66	28	100
	3100	Y	$10,000	12/64	88	35
	3200	Y	$14,000	5/64	66	X
	3300	Y	$19,500	9/65	54	50
	3400	Y	$18,000	11/64	19	X
	3500	Y	$30,000	9/67	0	7
	3600	Y	$48,000	6/64	45	X
	3800	Y	$49,300	2/66	16	14
	6400	Y	$52,100	5/66	12	19
	6600	Y	$117,000	8/64	22	17
	6800	Y	$130,000	4/67	0	4
Data Machines, Inc.	620	Y	$900	11/65	40	22
Digital Equipment Corp.	PDP-1	Y	$3400	11/60	60	X
	PDP-4	Y	$1700	8/62	57	X
	PDP-5	Y	$900	9/63	116	X
	PDP-6	Y	$10,000	10/64	20	1
	PDP-7	Y	$1300	11/64	105	28
	PDP-8	Y	$525	4/65	600	150
	PDP-9	Y	$1000	12/66	1	60
	PDP-10	Y	$7500	7/67	0	9
El-tronics, Inc.	ALWAC IIIE	N	$1820	2/54	14	X
Electronic Associates, Inc.	8400	Y	$12,000	6/65	15	7
General Electric	115	Y	$1800	12/65	265	540
	205	Y	$2900	6/64	44	X
	210	Y	$16,000	7/59	48	X
	215	Y	$6000	9/63	54	X
	225	Y	$8000	4/61	203	X
	235	Y	$10,900	4/64	70	2
	415	Y	$9600	5/64	209	53
	425	Y	$18,000	6/64	86	43
	435	Y	$25,000	9/65	33	17
	625	Y	$50,000	4/65	21	15
	635	Y	$56,000	5/65	18	15
	645	Y	$90,000	7/66	2	10
Honeywell	DDP-24	Y	$2500	5/63	88	X
	DDP-116	Y	$900	4/65	152	50
	DDP-124	Y	$2050	3/66	29	36
	DDP-224	Y	$3300	3/65	50	9
	DDP-516	Y	$700	9/66	15	90
	H-120	Y	$3900	1/66	370	290
	H-200	Y	$8400	3/64	1040	140
	H-400	Y	$8500	12/61	108	X
	H-800	Y	$28,000	12/60	89	1
	H-1200	Y	$8000	2/66	75	100
	H-1400	Y	$14,000	1/64	12	X

NAME OF MANUFACTURER	NAME OF COMPUTER	SOLID STATE?	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS	NUMBER OF UNFILLED ORDERS
Honeywell (cont'd)	H-1800	Y	$42,000	1/64	21	1
	H-2200	Y	$12,000	1/66	28	64
	H-4200	Y	$20,500	3/67	0	10
	H-8200	Y	$35,000	3/68	0	5
	DATA-matic 1000	N	$40,000	12/57	2	X
IBM	305	N	$3600	12/57	135	X
	360/20	Y	$2000	12/65	1675	6200
	360/30	Y	$7500	5/65	3125	4300
	360/40	Y	$15,000	4/65	1700	1600
	360/44	Y	$10,000	7/66	40	200
	360/50	Y	$26,000	8/65	200	600
	360/65	Y	$50,000	11/65	40	200
	360/67	Y	$75,000	10/66	6	50
	360/75	Y	$78,000	2/66	19	35
	360/90 Series	Y	$140,000	6/67	0	10
	650	N	$4800	11/54	168	X
	1130	Y	$1200	2/66	1200	4800
	1401	Y	$6600	9/60	7650	X
	1401-G	Y	$2300	5/64	1615	X
	1410	Y	$14,200	11/61	808	60
	1440	Y	$4800	4/63	3440	60
	1460	Y	$11,500	10/63	1750	X
	1620 I, II	Y	$4000	9/60	1670	20
	1800	Y	$7600	1/66	140	315
	701	N	$5000	4/53	1	X
	7010	Y	$22,600	10/63	216	6
	702	N	$6900	2/55	6	X
	7030	Y	$160,000	5/61	6	X
	704	N	$32,000	12/55	29	X
	7040	Y	$22,000	6/63	120	3
	7044	Y	$32,000	6/63	130	4
	705	N	$38,000	11/55	50	X
	7070, 2, 4	Y	$27,000	3/60	320	X
	7080	Y	$55,000	8/61	85	X
	709	N	$40,000	8/58	8	X
	7090	Y	$63,500	11/59	44	X
	7094	Y	$72,500	9/62	114	2
	7094 II	Y	$78,500	4/64	132	4
National Cash Register Co.	NCR - 304	Y	$14,000	1/60	25	X
	NCR - 310	Y	$2500	5/61	10	X
	NCR - 315	Y	$8500	5/62	400	120
	NCR - 315-RMC	Y	$12,000	9/65	55	50
	NCR - 390	Y	$1850	5/61	725	25
	NCR - 500	Y	$1500	10/65	925	850
Philco	1000	Y	$7010	6/63	16	X
	2000-210, 211	Y	$40,000	10/58	16	X
	2000-212	Y	$52,000	1/63	12	X
Radio Corporation of America	RCA 301	Y	$7000	2/61	643	1
	RCA 3301	Y	$17,000	7/64	69	4
	RCA 501	Y	$14,000	6/59	96	X
	RCA 601	Y	$35,000	11/62	5	X
	Spectra 70/15	Y	$4100	9/65	90	110
	Spectra 70/25	Y	$6700	9/65	47	60
	Spectra 70/35	Y	$10,400	1/67	18	115
	Spectra 70/45	Y	$17,400	11/65	24	90
	Spectra 70/55	Y	$40,500	11/66	2	14
Raytheon	250	Y	$1200	12/60	175	X
	440	Y	$3500	3/64	16	3
	520	Y	$3200	10/65	22	6
Scientific Control Corporation	650	Y	$500	5/66	9	5
	655	Y	$1800	2/67	0	3
	660	Y	$2000	10/65	6	3
	670	Y	$2600	5/66	1	2
	6700	Y	$45,000	12/67	0	1
Scientific Data Systems, Inc.	SDS-92	Y	$1500	4/65	80	19
	SDS-910	Y	$2000	8/62	190	6
	SDS-920	Y	$2900	9/62	144	8
	SDS-925	Y	$3000	12/64	35	12
	SDS-930	Y	$3400	6/64	145	20
	SDS-940	Y	$10,000	4/66	9	9
	SDS-9300	Y	$7000	11/64	33	6
	Sigma 2	Y	$1000	12/66	3	200
	Sigma 5	Y	$6000	8/67	0	10
	Sigma 7	Y	$12,000	12/66	4	25
Systems Engineering Labs	810	Y	$1000	9/65	24	X
	810A	Y	$900	8/66	10	9
	840	Y	$1400	11/65	4	X
	840A	Y	$1400	8/66	2	15
UNIVAC	I & II	N	$25,000	3/51 & 11/57	24	X
	III	Y	$20,000	8/62	74	X
	File Computers	N	$15,000	8/56	15	X
	Solid-State 80 I, II, 90 I, II & Step	Y	$8000	8/58	236	X
	418	Y	$11,000	6/63	105	35
	490 Series	Y	$35,000	12/61	135	50
	1004	Y	$1900	2/63	3150	40
	1005	Y	$2400	4/66	580	200
	1050	Y	$8000	9/63	300	30
	1100 Series (except 1107 & 1108)	N	$35,000	12/50	9	X
	1107	Y	$55,000	10/62	35	X
	1108	Y	$65,000	9/65	38	70
	9200	Y	$1500	6/67	0	900
	9300	Y	$3400	6/67	0	325
	LARC	Y	$135,000	5/60	2	X
				TOTALS	42,[illegible]91	24,[illegible]25

X = no longer in production.

* To avoid double counting, note that the Control Data 160 serves as the central processor of the NCR 310. Also, customers ordering a new computer model intended to replace a computer model in the same product line may continue to use their current peripheral equipment, which can account for 30-70% of the value of the total computer system.

February 17 - March 17, 1967

NEW YORK STOCK EXCHANGE	1966/67 High	1966/67 Low	4 weeks Sales in 100's	4 weeks High	4 weeks Low	Last	4 weeks Net Change	4 weeks % Change
Addressograph-Multigraph	77 3/8	49 1/8	2866	53 3/4	51 1/2	53 7/8	-7/8	- 1.63
American R & D	95 1/2	20 1/4	2938	95 1/2	59 1/4	82 3/4	+22	+36.21
Ampex Corp.	32 1/8	17	11,455	31 7/8	28	31 1/2	+ 1 1/2	+ 5.00
Burroughs	118 7/8	49 1/4	6211	118 7/8	94 1/8	114 7/8	+18 5/8	+19.35
Collins Radio	85 3/8	37 5/8	4635	80 1/4	68 1/2	80 1/4	+ 8 5/8	+12.04
Control Data	58 3/8	23 5/8	9054	58 3/8	48 3/8	58	+ 9	+18.37
Electronic Assoc.	27 1/8	12 1/4	4279	27 1/8	21	23 1/2	+ 1 5/8	+ 7.43
General Electric	120	80	6119	94 1/4	82 1/2	93	+ 8 1/8	+ 9.57
Honeywell	96	53 1/2	2608	88 1/4	76 5/8	85 3/8	+ 7 5/8	+ 9.81
IBM	450 1/4	289 1/2	1789	450 1/4	416	450 1/4	+25 5/8	+ 6.03
Inter. Tel. & Tel.	89 7/8	58 1/8	2701	89 7/8	83	87 7/8	+ 4 7/8	+ 5.87
Litton	101 7/8	56 5/8	4635	101 7/8	95 1/2	100 3/4	+ 8 5/8	+ 9.37
Nat. Cash Reg.	96	59	4148	96	81 1/4	95	+12 1/2	+15.15
RCA	62 1/4	36 3/4	7401	51 1/2	46 1/2	49 3/4	+ 2 1/2	+ 5.29
Raytheon	67 5/8	36	3736	67 5/8	60 3/8	66	+ 4 1/4	+ 6.88
Sanders	87	36 1/2	2806	87	64 1/4	79 5/8	+13 3/8	+20.19
Scientific Data	111	41 1/4	5563	111	85 3/8	100 3/8	+15 7/8	+18.78
SCM	91 7/8	42 1/8	8656	79 1/4	71 3/4	72 3/8	- 1 1/2	- 2.03
Singer	64 3/4	39 3/8	2095	57 1/8	54 1/8	56 1/2	+3/8	+ .67
Sperry Rand	36	17 1/8	20,383	36	31 5/8	33 3/4	+ 1 3/8	+ 4.25
Teledyne	143 1/2	50 3/8	3633	143 1/2	114 1/8	140 3/4	+22	+18.53
NYSE COMPUTER STOCK AVERAGE							+ 8.86	+13.91
AMERICAN STOCK EXCHANGE								
ANelex	28	7 3/8	907	19 3/8	15 3/8	17 1/2	+ 1 3/8	+ 8.53
Audio Devices, Inc.	41 1/4	17	1436	30 3/8	22	27 1/8	---	---
Bunker-Ramo	12 7/8	4 5/8	6338	12 7/8	8 1/2	10 3/4	+ 1 7/8	+21.13
Cal Comp	49 1/4	13 1/4	1587	49 1/4	39 1/2	47 1/4	+ 6	+14.54
Clary	8 1/2	3 5/8	2727	8 1/2	5 3/4	7 7/8	+ 2 1/8	+36.95
Computer Applications	26 1/4	8	1820	19 7/8	15 1/4	19 1/8	+ 2 1/8	+12.50
Computer Sciences	42	15 1/4	2863	42	32	41 5/8	+ 8 3/8	+25.19
Digital Equipment	65 1/4	27 1/4	2301	65 1/4	48 1/4	58	+ 6 3/4	+13.17
Leasco Data Proc. Equip. Corp.	57 5/8	18 1/2	1712	57 5/8	49	53 1/8	+ 3 5/8	+ 7.32
Levin-Townsend Comp. Corp.	29 1/4	8 1/2	1651	29 1/4	20 1/2	27 1/4	+ 6 3/4	+32.92
Milgo Elect.	8 7/8	4	301	7 3/4	6 3/4	7 1/4	---	---
Planning Research	36 1/2	12 7/8	405	29	23 3/8	28 1/2	+ 2 1/2	+ 9.62
Potter Instrument	26 3/8	9 1/8	2321	19 5/8	16 3/8	19	+ 2	+11.76
AMSE COMPUTER STOCK AVERAGE							+ 3.35	+14.89

OVER-THE-COUNTER	1966/67 High Bid	1966/67 Low Bid	March 17 Bid	March 17 Asked	4 weeks ago Bid	4 week net change (Bid)	4 week % change (Bid)
Applied Data Research, Inc.	6 3/4	3 1/8	5 3/4	6 1/4	4 1/8	+ 1 5/8	+39.39
Aries Corp	14 3/4	11 1/8	14 1/2	14 3/4	11 1/2	+ 3	+26.09
Automatic Data Processing	35 1/2	23 1/2	31 1/4	32 1/4	28 1/2	+ 2 3/4	+ 9.65
Bolt, Beranek & Newman, Inc.	12 7/8	8 1/4	12	12 1/2	12 1/2	-1/2	- 4.00
C-E-I-R	14 1/4	6 5/8	13 1/8	13 3/8	10 1/2	+ 2 5/8	+25.00
Computer Usage	34 1/2	20 1/2	33 1/2	35 1/2	32 1/2	+ 1	+ 3.08
Cyber-tronics	8 1/2	4 3/4	7 1/4	8	7 3/4	-1/2	- 6.45
Data Products	7 7/8	2 1/2	7 3/8	7 5/8	5 1/2	+ 1 7/8	+34.09
Digitronics	12 3/4	6	11 1/4	12	9	+ 2 1/4	+25.00
Documentation, Inc.	7 3/4	3 3/4	6 7/8	7 1/8	6 1/4	+5/8	+10.00
DPA, Inc.	11 5/8	4 1/4	9 5/8	10 1/8	6 1/8	+ 3 1/2	+57.14
Electronic Memories	19 3/8	12 3/4	16	16 1/2	17	- 1	- 5.88
Fabri-Tek	10 3/4	6	10 1/8	10 5/8	8 5/8	+ 1 1/2	+17.39
G-C Computer	22 1/4	10 1/4	21	21 1/2	13 1/4	+ 9	+58.49
Informatics, Inc.	21	7 1/2	18 1/2	19 1/2	16 3/4	+ 1 3/4	+10.45
Management Assistance	21 1/2	13 5/8	19 1/8	19 3/8	18 1/4	+7/8	+ 4.79
Memorex	93	63	93	94 1/2	88	+ 5	+ 5.68
Mohawk Data Sciences	60 3/4	32	60 1/2	61 1/4	49 1/4	+11 1/4	+22.84
Randolph Computer Corp.	41 1/2	14 3/4	41 1/2	43 1/2	33 1/2	+ 8	+23.88
Recognition Equipment, Inc.	98	48 1/2	92	94	69 1/2	+22 1/2	+32.37
Standard Computers	16	11 1/4	15 1/2	16	11 1/4	+ 4 3/4	+39.13
Systems Engineering Labs	22	14 3/4	21 1/2	22	14 3/4	+ 7 1/4	+49.15
University Computing Co.	45 1/2	30 3/4	44 1/2	45 1/2	30 3/4	+14 3/4	+47.97

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E|D|P
INDUSTRY AND
MARKET REPORT

A SEMI-MONTHLY NEWSLETTER FOR EXECUTIVES
IN THE ELECTRONIC DATA PROCESSING INDUSTRY,
AND THE FINANCIAL COMMUNITY.

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Unexpected choice

IBM CAPTURES $100 MILLION AIR FORCE CONTRACT; SELECTION SURPRISES INDUSTRY, RAISES CONCERN OVER COMPETITIVE DOMINATION

The Air Force has made it official: IBM has been selected to provide EDP equipment for the USAF Base Level Data Automation Standardization Program. This contract, which can lead to the installation of 360/30 and 40 computers and associated communications equipment at 100 to 160 AF bases around the world, is expected to be worth close to $100 million to IBM during the next two and a half years (EDP I&MR, Jan. 12, 1967).

The announcement, which was delayed several times during a two-week period, took almost everyone in the industry by surprise. Burroughs, Honeywell, and RCA also bid on the contract, and the first two were considered front runners. A lot of the details are not yet available, but questions are being raised as the surprise begins to fade away.

The selection process

The biggest question concerns the basis for IBM's selection. The Air Force release says simply: "IBM was selected on the basis of receiving the highest evaluation in meeting the requirements of the program." A service spokesman says that selection criteria included (1) cost, (2) vendor support, (3) technical performance, and (4) benchmark demonstration results, but he declines to indicate how much weight was placed on each factor in the Air Force's evaluation.

The losing bidders clearly expected cost to be given an important weight in the selection process. They knew that they couldn't expect to equal IBM in vendor support, particularly outside the U.S., and they anticipated that all competitors would be closely grouped in technical performance. They bargained, therefore, that a lower cost might give one of them the competitive edge.

The validity of their reasoning can be judged when the winning bid price is known. The Air Force says it "can't divulge it" at this time, and several factors make estimations of it quite difficult. For one, some companies might underbid on such a large government computer contract -- perhaps even at a loss -- if they can expect the systems to be upgraded, in the reasonable future, with additional peripheral components . . . on a sole source, list price basis. IBM, however, is unlikely to get involved in such discounting since its large volume of existing government computer business would produce substantial charge-backs if it should price much below GSA schedule rates.

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From informed trade comments, EDP I&MR believes that Honeywell and Burroughs bid in the neighborhood of $65 to $70 million, and that IBM's bid was as much as $15 to $20 million higher. If these estimates are accurate, the question arises, why did IBM prove the victor at such a higher bid price? The answer to this is by no means clear, and there is considerable puzzling in the industry over it right now. Some of the explanations may come forth in about two weeks when the losers are debriefed and the characteristics of the winning bid are clarified.

What it means

The Air Force's initial commitment to IBM equipment is quite small. Only $1.5 million is appropriated for the IBM 360/30 and 40 computers during the next year, and the Air Force has postponed the decision to buy or lease additional computers. Two systems (to Washington, D.C. and Randolph AFB, Texas) are to be delivered in July; two more (for training at Sheppard AFB, Texas) will be delivered in the fall. The Air Force operational test site at Langley AFB, Virginia is to be equipped by yearend.

If evaluations at Langley are successful, the Air Force says, installation at bases throughout the service will get underway in April, 1968, and will be completed by December, 1969. However, there is always the possibility that technical, administrative, or other (political?) factors could alter the size and extent of the actual procurement at this stage.

Even the full contract, of course, won't seriously affect either the production schedule or revenue flow for IBM, which currently is delivering over 1000 computers a month. Had one of the other manufacturers been selected, however, the $100 million order would be a large share of its business, and production and delivery schedules would certainly be juggled as delivery requirements peaked in 1968.

The importance of the contract to IBM, is, we believe,that it prevents a loss of prestige. No competitor can now use its selection as a selling point against IBM, and the industry giant has a solid retort to criticisms of system performance. Indeed, it has gained two sales points: 1) the Air Force laid down stringent requirements for its data automation system, and IBM received "the highest evaluation" in meeting them; 2) the medium-scale IBM 360's are now endorsed as a standard, and competitors may be forced to conform more closely to the 360 concept.

The three companies that also bid -- at costs of $1 to $2 million each -- have yet to react officially to the contract award. Each of the losing bidders, indeed, probably has his pride hurt more than his pocketbook, although there are calls of "foul!" All three of them are in a good position for future government and commercial business keyed to the Air Force specifications. And Burroughs, with $25 million of its computers at Air Force bases, being replaced by the IBM equipment, has just won several large computer orders in the banking industry (see story, page 4), and may well take this as a justification to concentrate in a field that it knows well.

The backwash

Rumors of contract rigging are easy to find, and there is much disappointment and bitterness. One company, off the record, calls the bidding procedure "an exercise in futility." The award may well add volatile fuel to antitrust fires, and the question of industry dominance by IBM is being raised more dramatically than

at any time in recent memory. There is the assertion, which can be disputed, that IBM can so overwhelm its competitors with human and cash resources that, when it wants to, it can virtually dominate the attention of members of a contract selection committee so fully that only its equipment is seriously considered.

Indications are firm that official protests may be lodged, and that pressure may be exerted to have the scope of the award scaled down. Such may be the considerations of many top industry personnel as they meet in Atlantic City next week for their semi-annual Joint Computer Conference.

Conclusion

IBM has the contract. If any peculiarities were involved in the selection process, they should be aired and corrected. EDP I&MR continues to admire, however, the concept behind the specifications of the Air Force contract and to think there are clear opportunities for the firms that bid and lost. The step that has been taken toward standardization is far more important -- and potentially more profitable -- than the actual contract itself.

MASS MEMORIES . . . A MISHAP, AND MAYBE A MILESTONE

In the research labs of computer-related companies, mass memory is one subject that gets lots of attention, since future systems will require reliable memories that are faster, larger, and less expensive than those in use today. Indeed, as remote access terminals come into wider use, memory hierarchies could well constitute a major portion of central computer configurations. Two companies looking for the answer are in the news:

- Itek, which for years and until recent months has talked about marketing its photo-optical Memory Centered Processor, has finally admitted its "disappointment" and relegated the MCP back to the research lab.
- RCA, after 11 years of research, has announced what it calls the first practical process for building a superconductive computer memory.

One problem in developing mass memories has been to get rid of moving parts. The thin films and ferrite cores, used as the main memory in most modern computers, fit this requirement, but have too high a cost-per-bit for use as large memories except in specialized applications. On the other hand, drums, disks, and magnetic strips -- used as auxiliary memories in most computer installations -- all rely on mechanical positioning for the transfer of digital data.

In fact, it was electro-mechanical components that gave Itek some of its problems with the MCP, in which a laser beam reads strings of data encoded in microscopic rings on a sensitized glass disk. Itek also had problems with electronic circuitry and reportedly with the control of the laser beam.

The new RCA memory, developed at its David Sarnoff Research Center, has no moving parts. Bits of data are stored as tiny endless loops of current, flowing within grains of metals such as tin that have no electrical resistance when cooled to near Absolute Zero (-459.7° F). In principal, fabrication should be quite easy, since the memory consists of thin films of superconductive material deposited on glass slides. Core memories, in contrast, are made of tiny ferrite donuts, interconnected with hair-thin strands of wire.

The unit built by RCA researchers stores 14,120 bits of data on four coated slides stacked one atop the other and interconnected along their edges. It is no larger than a box of playing cards. And as techniques are refined, the company says, it can build cryogenic memories that store up to a billion bits.

Commercial plans are not firm, since the memory is still in development. It will definitely have to be used in arrays of 10 million bits and larger, but at this size, according to the head of RCA's Cryoelectric Devices Laboratory, the superconductive memory would cost "substantially less than competitive products" such as screen door core memories. Speeds of the first commercial units will be in the one to two microsecond range.

Both the RCA and the Itek memories evolved from programs sponsored by the Air Force Systems Command, Wright-Patterson AFB, Ohio. And although Itek has sent its memory back to the lab -- and charged against profit some $566,000 of undepreciated cost of the equipment -- it still is interested in the original motive for the project, language translation. The company presently plans to continue its work on stenotype transcription, but will use magnetic memories to store the dictionary.

BURROUGHS GETS BIG ORDERS AS BRITISH BANKS GO TO COUNTRYWIDE NETWORKS

Three of Britain's top five banks, in rapid-fire succession, have ordered over $40 million of terminal devices from Burroughs. In addition, the largest of them has said that it will also purchase a B-8500 super computer as the nucleus of its on-line branch banking system. These orders may well be more important for Burroughs than the Air Force Phase II contract (see page 1) for which it was considered a likely prospect.

The first and largest order -- for a total of $32.2 million -- came from Barclays Bank Ltd., the world's largest bank outside the United States. It will use an 8500 to make some 4.5 million accounts accessible from almost 2500 branch office terminals. Midland Bank is spending $16.8 million for 1850 terminals to tie together a group of EELM System 4-70 computers (based on RCA technology developed in connection with Spectra 70) located in regional centers. And Westminster Bank has ordered another 800 terminals, for $7 million, to tie its branches to a central computing center in London. National Provincial Bank has announced plans to link some 1630 branches to a computer center, but as yet hasn't decided on terminals.

Exactly what these banks are buying hasn't been spelled out by Burroughs. The terminals, called TC-500 terminal computers, "are being custom-built to meet British banking specifications for real-time, on-line financial data processing", the company says. Other than this, however, "it is premature to discuss details at this time." EDP I&MR understands, however, that the TC-500 can operate on- or off-line and is based on a small computer system that Burroughs will announce at a later date. It could thus form the upper end of the company's electronic accounting equipment as well as be the terminal computer for larger systems.

Burroughs is the No. 2 computer supplier to banks (EDP I&MR, Dec. 1, 1966), and certainly has a significant stake in the industry. Its British subsidiary, Burroughs Machines Ltd., will be manufacturing and delivering the TC-500's starting next year. It was designed in the United States, however, and will be built and marketed here as well. With banks a large potential user of on-line systems, Burroughs seems to have an important tool to enhance its position in the banking industry.

INTERNATIONAL NEWS . . . UNIVAC LANDS ORDERS FOR COMMUNICATIONS-ORIENTED SYSTEMS

Traditionally, computer users in Western Europe have lagged about three to five years behind those in the United States in terms of sophistication. This gap is closing, however (EDP I&MR, Mar. 22, 1967), and Europeans will likely benefit from earlier efforts by American-based companies. Recently, in growing numbers, planned and installed communications-oriented systems have been announced. And UNIVAC, to date, clearly has an impressive number of international orders for computer-oriented data communication systems.

Several ambitious systems have been announced by international organizations. These assuredly rely on UNIVAC's experience with similar problems, and when implemented they likely will be on a par with advanced systems in the U.S. For example:

- Royal Dutch-Shell has begun work on a Europe-wide information network, centered around three UNIVAC 1108's. At the outset, Shell's many branches throughout the United Kingdom will communicate on-line to the London 1108 via 1004 terminals. Eventually, London will be linked to 1108's in Paris and Frankfurt, tying Shell's European operations together into a single network.
- Karstadt, the German department store chain, has recently ordered a UNIVAC 494 for its headquarters in Essen. When the system first becomes operational in early 1968, only a small number of branches will be linked to the central computer. By 1970, however, the store expects to have its 110 branches on line with the central computer.
- The largest private mortgage bank in West Germany, Munich's Bayerische Hypotheken and Wechsel Bank, has ordered a UNIVAC 491 system which will be installed this summer. Initially, it will handle only central office business with a 1004 operating both off-line and on-line. The system will be extended, however, to handle on-line operations from 50 branches.
- And in Japan, Kawaski Steel, a major producer, has installed a 494 in its Kobe headquarters. It will form the basis of an integrated business system, claimed to be the most ambitious project yet undertaken by a private Japanese firm.

In Europe, one cross-Channel link is already in operation. Recently, Computer Services Birmingham, which operates a UNIVAC 1107 in Birmingham, has tied its 1004 in London to a second 1107 at the Swedish State Cities Council in Stockholm. Also, in past months, UNIVAC has sold two 1108's to the French Railways and two 418's each to TWA in Zurich and the Frankfurt message-switching center of the Ste. International de Telecommunications Aeronautiques. And Down Under, the Australian Overseas Telecommunications Commission has ordered two 418's for a message switching center, outside of Sydney, which will be operational late this year.

Communication systems, in fact, may grow faster in Europe than in the United States. Distances there are not so great, and population centers are more concentrated. Also, public telephone exchange service is generally less adequate for data communications than that available in the U.S., so companies must develop private systems with message switching computers. Indeed, with computers, such concerns can eliminate many problems created by language and cultural differences by eliminating direct voice information transmission. As more and more foreign companies recognize these advantages, American computer manufacturers can gain markets for their latest systems, as there is pressure in many European quarters for procuring the most modern equipment -- no matter what the country of origin.

MONTHLY COMPUTER CENSUS

THE NUMBER OF ELECTRONIC COMPUTERS INSTALLED OR ON ORDER AT ANY ONE TIME HAS BEEN INCREASING RAPIDLY DURING THE PAST SEVERAL YEARS. NEW MODELS HAVE BEEN OFFERED IN THE COMPUTER MARKET, AND FAMILIAR MACHINES HAVE GONE OUT-OF-PRODUCTION AND SUBSEQUENTLY BEEN RETIRED FROM ACTIVE USE AND DISMANTLED. SOME NEW COMPUTERS HAVE BEEN RECEIVED WITH OPEN ARMS BY USERS -- OTHERS HAVE BEEN GIVEN THE COLD SHOULDER.

TO AID OUR READERS IN KEEPING UP WITH THIS RAPIDLY CHANGING PROFILE OF COMPUTER USE, EDP I&MR PRESENTS THIS MONTHLY REPORT ON THE NUMBER OF GENERAL PURPOSE ELECTRONIC DIGITAL COMPUTERS MADE BY U.S.-BASED COMPANIES WHICH ARE INSTALLED OR ON ORDER AS OF THE PRECEDING MONTH. THESE CENSUS FIGURES INCLUDE INSTALLATIONS AND ORDERS OUTSIDE THE UNITED STATES. THE FIGURES ARE COMPILED AND UPDATED EACH MONTH BY THE INTERNATIONAL DATA CORPORATION, NEWTONVILLE, MASS., A MARKET RESEARCH FIRM SPECIALIZING IN THE INFORMATION PROCESSING INDUSTRY AND THE PUBLISHER OF THE EDP I&MR. WE HOPE THEY WILL SERVE AS A USEFUL "BOX-SCORE" OF PROGRESS FOR READERS INTERESTED IN FOLLOWING THE GROWTH OF THE U.S. COMPUTER INDUSTRY AND OF THE COMPUTING POWER IT BUILDS.

IN GENERAL, MANUFACTURERS IN THE COMPUTER FIELD DO NOT OFFICIALLY RELEASE INSTALLATION AND ON-ORDER FIGURES. THE FIGURES IN THIS CENSUS ARE DEVELOPED THROUGH A CONTINUING MARKET SURVEY CONDUCTED BY THE INTERNATIONAL DATA CORPORATION. THIS MARKET RESEARCH PROGRAM COMPILES AND MAINTAINS A WORLDWIDE COMPUTER INSTALLATION LOCATOR FILE WHICH IDENTIFIES, BY CUSTOMER, THE INSTALLATION SITES OF ELECTRONIC COMPUTERS. THE RESULTING CENSUS COUNTS ARE SUBMITTED TO INDIVIDUAL COMPUTER MANUFACTURERS FOR THEIR REVIEW AND VOLUNTARY CONFIRMATION.

COMMENTS ON THIS CENSUS FROM INFORMED READERS WILL BE WELCOMED.

AS OF MARCH 10, 1967

NAME OF MANUFACTURER	NAME OF COMPUTER	SOLID STATE?	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS	NUMBER OF UNFILLED ORDERS
ASI Computer	ASI 210	Y	$3850	4/62	26	0
	ASI 2100	Y	$4200	12/63	7	0
	ADVANCE 6020	Y	$4400	4/65	13	14
	ADVANCE 6040	Y	$5600	7/65	8	12
	ADVANCE 6050	Y	$9000	2/66	6	8
	ADVANCE 6070	Y	$15,000	10/65	5	6
	ADVANCE 6130	Y	$1000	2/67	5	20
Autonetics	RECOMP II	Y	$2495	11/58	34	X
	RECOMP III	Y	$1495	6/61	7	X
Bunker-Ramo Corp.	BR-130	Y	$2000	10/61	160	X
	BR-133	Y	$2400	5/64	33	33
	BR-230	Y	$2680	8/63	15	X
	BR-300	Y	$3000	3/59	33	X
	BR-330	Y	$4000	12/60	29	X
	BR-340	Y	$7000	12/63	20	X
Burroughs	205	N	$4600	1/54	40	X
	220	N	$14,000	10/58	33	X
	B100	Y	$2800	8/64	178	10
	B250	Y	$4200	11/61	84	1
	B260,263	Y	$3750	11/62	225	2
	B270,273	Y	$7000	7/62	166	2
	B280,283	Y	$6500	7/62	130	3
	B300	Y	$10,000	7/65	144	72
	B2500	Y	$5000	2/67	1	48
	B3500	Y	$14,000	5/67	0	50
	B5500	Y	$22,000	3/63	62	9
	B6500	Y	$33,000	2/68	0	12
	B8500	Y	$200,000	2/67	0	3
Control Data Corporation	G-15	N	$1600	7/55	280	X
	G-20	Y	$15,500	4/61	25	X
	LGP-21	Y	$725	12/62	160	X
	LGP-30	semi	$1300	9/56	134	X
	RPC-4000	Y	$1875	1/61	64	X
	160*/160A/160G	Y	$2100/$5000/$12,000	5/60;7/61;3/64	463	X
	924/924A	Y	$11,000	8/61	28	X
	1604/1604A	Y	$45,000	1/60	59	X
	1700	Y	$3500	5/66	54	175
	3100	Y	$10,000	12/64	92	34
	3200	Y	$14,000	5/64	66	X
	3300	Y	$19,500	9/65	55	52
	3400	Y	$18,000	11/64	19	X
	3500	Y	$30,000	9/67	0	9
	3600	Y	$48,000	6/63	45	X
	3800	Y	$49,300	2/66	16	13
	6400	Y	$52,100	5/66	12	20
	6600	Y	$117,000	8/64	24	18
	6800	Y	$130,000	4/67	0	4
Data Machines, Inc.	620	Y	$900	11/65	42	20
Digital Equipment Corp.	PDP-1	Y	$3400	11/60	59	X
	PDP-4	Y	$1700	8/62	56	X
	PDP-5	Y	$900	9/63	115	X
	PDP-6	Y	$10,000	10/64	24	1
	PDP-7	Y	$1300	11/64	124	28
	PDP-8	Y	$525	4/65	650	180
	PDP-9	Y	$1000	12/66	3	60
	PDP-10	Y	$7500	7/67	0	11
El-tronics, Inc.	ALWAC IIIE	N	$1820	2/54	14	X
Electronic Associates, Inc.	8400	Y	$12,000	6/65	15	9
General Electric	115	Y	$1800	12/65	285	580
	205	Y	$2900	6/64	42	X
	210	Y	$16,000	7/59	48	X
	215	Y	$6000	9/63	54	X
	225	Y	$8000	4/61	203	X
	235	Y	$10,900	4/64	72	1
	415	Y	$9600	5/64	209	53
	425	Y	$18,000	6/64	80	40
	435	Y	$25,000	9/65	25	16
	625	Y	$50,000	4/65	21	15
	635	Y	$56,000	5/65	20	18
	645	Y	$90,000	7/66	2	9
Honeywell	DDP-24	Y	$2500	5/63	87	X
	DDP-116	Y	$900	4/65	165	40
	DDP-124	Y	$2050	3/66	32	35
	DDP-224	Y	$3300	3/65	52	8
	DDP-516	Y	$700	9/66	30	125
	H-120	Y	$3900	1/66	400	310
	H-200	Y	$8400	3/64	1040	150
	H-400	Y	$8500	12/61	101	X

NAME OF MANUFACTURER	NAME OF COMPUTER	SOLID STATE	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS	NUMBER OF UNFILLED ORDERS
Honeywell (cont'd)	H-800	Y	$28,000	12/60	90	1
	H-1200	Y	$8000	2/66	85	95
	H-1400	Y	$14,000	1/64	12	X
	H-1800	Y	$42,000	1/64	20	1
	H-2200	Y	$12,000	1/66	33	60
	H-4200	Y	$20,500	3/67	0	9
	H-8200	Y	$35,000	3/68	0	5
IBM	305	N	$3600	12/57	132	X
	360/20	Y	$2000	12/65	2025	6100
	360/30	Y	$7500	5/65	3400	4200
	360/40	Y	$15,000	4/65	1850	1550
	360/44	Y	$10,000	7/66	44	180
	360/50	Y	$26,000	8/65	260	680
	360/65	Y	$50,000	11/65	55	260
	360/67	Y	$75,000	10/66	7	50
	360/75	Y	$78,000	2/66	20	40
	360/90 Series	Y	$140,000	6/67	0	10
	650	N	$4800	11/54	160	X
	1130	Y	$1200	2/66	1350	4700
	1401	Y	$6600	9/60	7645	X
	1401-G	Y	$2300	5/64	1615	X
	1410	Y	$14,200	11/61	812	55
	1440	Y	$4800	4/63	3440	100
	1460	Y	$11,500	10/63	1730	X
	1620 I, II	Y	$4000	9/60	1665	15
	1800	Y	$7600	1/66	155	315
	701	N	$5000	4/53	1	X
	7010	Y	$22,600	10/63	216	6
	702	N	$6900	2/55	7	X
	7030	Y	$160,000	5/61	6	X
	704	N	$32,000	12/55	28	X
	7040	Y	$22,000	6/63	118	2
	7044	Y	$32,000	6/63	130	4
	705	N	$38,000	11/55	49	X
	7070, 2, 4	Y	$27,000	3/60	316	X
	7080	Y	$55,000	8/61	85	X
	709	N	$40,000	8/58	8	X
	7090	Y	$63,500	11/59	44	X
	7094	Y	$72,500	9/62	116	2
	7094 II	Y	$78,500	4/64	128	2
National Cash Register Co.	NCR - 304	Y	$14,000	1/60	25	X
	NCR - 310	Y	$2500	5/61	15	X
	NCR - 315	Y	$8500	5/62	425	125
	NCR - 315-RMC	Y	$12,000	9/65	60	45
	NCR - 390	Y	$1850	5/61	690	25
	NCR - 500	Y	$1500	10/65	1000	800
Philco	1000	Y	$7010	6/63	16	X
	2000-210, 211	Y	$40,000	10/58	16	X
	2000-212	Y	$52,000	1/63	12	X
Radio Corporation of America	RCA 301	Y	$7000	2/61	643	1
	RCA 3301	Y	$17,000	7/64	72	4
	RCA 501	Y	$14,000	6/59	96	X
	RCA 601	Y	$35,000	11/62	5	X
	Spectra 70/15	Y	$4100	9/65	94	130
	Spectra 70/25	Y	$6700	9/65	60	55
	Spectra 70/35	Y	$10,400	1/67	18	135
	Spectra 70/45	Y	$17,400	11/65	60	105
	Spectra 70/55	Y	$40,500	11/66	2	14
Raytheon	250	Y	$1200	12/60	175	X
	440	Y	$3500	3/64	16	2
	520	Y	$3200	10/65	22	5
Scientific Control Corporation	650	Y	$500	5/66	9	6
	655	Y	$1800	2/67	1	4
	660	Y	$2000	10/65	6	3
	670	Y	$2600	5/66	2	2
	6700	Y	$45,000	10/67	0	1
Scientific Data Systems Inc.	SDS-92	Y	$1500	4/65	88	40
	SDS-910	Y	$2000	8/62	200	16
	SDS-920	Y	$2900	9/62	150	25
	SDS-925	Y	$3000	12/64	37	30
	SDS-930	Y	$3400	6/64	200	48
	SDS-940	Y	$10,000	4/66	11	28
	SDS-9300	Y	$7000	11/64	31	14
	Sigma 2	Y	$1000	12/66	8	200
	Sigma 5	Y	$6000	8/67	0	18
	Sigma 7	Y	$12,000	12/66	5	26
Systems Engineering Labs	810	Y	$1000	9/65	24	X
	810A	Y	$900	8/66	15	14
	840	Y	$1400	11/65	3	X
	840A	Y	$1400	8/66	6	20
Univac	I & II	N	$25,000	3/51 & 11/57	24	X
	III	Y	$20,000	8/62	70	X
	File Computers	N	$15,000	8/56	15	X
	Solid-State 80I, II, 90 I, II & Step	Y	$8000	8/58	230	X
	418	Y	$11,000	6/63	110	35
	490 Series	Y	$35,000	12/61	144	55
	1004	Y	$1900	2/63	3200	60
	1005	Y	$2400	4/66	600	220
	1050	Y	$8000	9/63	290	26
	1100 Series (except 1107)	N	$35,000	12/50	9	X
	1107	Y	$55,000	10/62	35	X
	1108	Y	$65,000	9/65	44	70
	9200	Y	$1500	6/67	0	900
	9300	Y	$3400	6/67	0	500
	LARC	Y	$135,000	5/60	2	X
				TOTALS	44,078	24,588

STOCK MARKET REPORT ON SELECTED EDP FIRMS

March 17 - April 7, 1967

NEW YORK STOCK EXCHANGE	1967 High	1967 Low	Sales in 100's	3 weeks High	3 weeks Low	Last	3 weeks Net Change	3 weeks % Change
Addressograph-Multigraph	59 1/4	49 1/4	1265	54	49	49 1/4	-4 5/8	-8.58
American R & D	95 1/2	37 3/4	770	84 1/4	77	79 1/2	-3 1/4	-3.93
Ampex Corp	32 3/4	22 3/4	4832	32 3/4	29 1/2	29 1/2	-2	-6.34
Burroughs	124 7/8	80 7/8	3259	124 7/8	109 7/8	115 1/8	+1/4	+0.22
Collins Radio	80 7/8	53	1778	80 7/8	71 5/8	71 5/8	-8 5/8	-10.75
Control Data	58 1/2	33 1/2	6399	64	48 3/8	60 1/8	+2 1/8	+3.66
Electronic Assoc	27 1/8	16 3/4	1732	24	20 5/8	20 5/8	-2 7/8	-12.23
General Electric	94 1/4	82 1/2	4529	92 1/2	83 3/4	85 7/8	-7 1/8	-7.66
Honeywell	88 1/4	63 1/2	1608	86 1/4	82	82 3/8	-3	-3.51
IBM	461	362 1/2	1034	461	437	446 5/8	-3 5/8	-0.81
Inter Tel & Tel	90 1/4	72 1/2	1931	90 1/4	85 1/4	89 1/4	+1 3/8	+1.56
Litton	106 3/4	79 1/2	2936	106 3/4	96 3/4	100 1/8	-5/8	-0.62
Nat Cash Register	96	67 1/8	1012	96	91	91 3/8	-3 5/8	-3.82
RCA	51 1/2	42 5/8	4157	48 1/2	45 3/4	46	-3 3/4	-7.54
Raytheon	69 5/8	49	2252	69 5/8	64 1/4	66	--	--
Sanders	87	53 1/4	807	82 1/4	76 1/4	78 3/8	-1 1/4	-1.57
Scientific Data	111	63 7/8	4450	107 1/4	88 5/8	94 3/4	-5 5/8	-5.60
SCM	79 1/4	52 5/8	5868	73	62 3/8	62 3/4	-9 5/8	-13.30
Singer	58 1/2	45	1669	60 3/8	56 1/2	59 1/8	+2 5/8	+4.64
Sperry Rand	36	28 1/8	18,862	34 3/8	30	30 3/4	-3	-8.88
Teledyne	155	80 1/8	2741	155	136 1/4	137 1/8	-3 5/8	-2.58
NYSE COMPUTER STOCK AVERAGE							-2.85	-3.44
AMERICAN STOCK EXCHANGE								
ANelex	19 3/8	11 1/2	406	17 1/2	14 1/4	14 3/4	-2 3/4	-15.71
Audio Devices, Inc	30 3/8	21 5/8	535	28 3/8	25 1/4	27	-1/8	-0.46
Bunker-Ramo	12 1/4	7 1/2	1935	11 3/8	10	10 5/8	-1/8	-1.16
Cal Comp	67 5/8	29 1/8	1391	67 5/8	57	60	+12 3/4	+26.98
Clary	8 1/4	4 1/8	804	8 1/4	7 1/4	7 3/8	-1/8	-1.59
Computer Applications	19 7/8	14	647	19 5/8	17 3/8	17 3/8	-1 3/4	-9.15
Computer Sciences	43	20 3/4	1237	43	38 3/8	40 3/8	-1 1/4	-3.00
Digital Equipment	65 1/4	29 3/8	982	62 7/8	54 3/4	60 1/2	+2 1/2	+4.31
Leasco Data Proc Equip Corp	64 1/2	33 5/8	1257	64 1/2	50 3/4	59	+5 7/8	+11.06
Levin-Townsend Computer Corp	32 1/4	10 7/8	1242	32 1/4	24 1/8	31 1/8	+3 7/8	+14.22
Milgo Electronics	7 3/4	5 1/8	165	7 3/8	6 3/8	6 1/2	-3/4	-10.34
Planning Research	29	19 5/8	129	28 1/2	26 1/4	26 1/2	-2	-7.02
Potter Instrument	19 5/8	12 3/8	1022	19 1/8	16 3/4	17 1/2	-1 1/2	-7.89
AMEX COMPUTER STOCK AVERAGE							-1.13	-0.02

OVER-THE-COUNTER	1967 High Bid	1967 Low Bid	April 7 Bid	April 7 Asked	3 weeks ago Bid	3 week Net Change Bid	3 week % Change Bid
Applied Data Research, Inc	6 3/4	3 1/8	5	5 1/2	5 3/4	-3/4	-13.04
Aries Corp	14 3/4	11 1/8	12 5/8	13	14 1/2	-1 7/8	-12.93
Automatic Data Processing	35 1/2	23 1/2	31 3/4	32 3/4	31 1/4	+1/2	+1.61
Bolt, Beranek & Newman, Inc	14 3/4	8 1/4	13 1/8	13 5/8	12	+1 1/8	+9.38
C-E-I-R	14 1/4	6 5/8	10 3/4	11 1/8	13 1/8	-2 3/8	-18.09
Computer Usage	44 1/2	20 1/2	39	41	33 1/2	+5 1/2	+16.42
Cyber-tronics	8 1/2	4 3/4	9 1/2	10 1/4	7 1/4	+2 1/4	+31.03
Data Products	8 1/2	2 1/2	8	8 1/4	7 3/8	+5/8	+8.47
Digitronics	12 3/4	6	12	12 1/2	11 1/4	+3/4	+6.67
Documentation, Inc	8 1/2	3 3/4	8	8 3/8	6 7/8	+1 1/8	+16.36
DPA, Inc	11 5/8	4 1/4	10 3/4	11 1/4	9 5/8	+1 1/8	+11.69
Electronic Memories	19 3/8	12 3/4	17 1/2	18	16	+1 1/2	+9.38
Fabri-Tek	10 3/4	6	8 1/2	9	10 1/8	-1 5/8	-16.05
G-C Computer	24 1/4	10 1/4	N/A	N/A	21		
Informatics, Inc -	21	7 1/2	18 1/2	19 1/2	18 1/2	--	--
Management Assistance	21 1/2	13 5/8	16	16 1/2	19 1/8	-3 1/8	-16.34
Memorex	97	63	89 1/2	91	93	-3 1/2	-3.76
Mohawk Data Sciences	65	32	64	65	60 1/2	+3 1/2	+5.79
Randolph Computer Corp	44 1/2	14 3/4	46 1/2	48 1/2	41 1/4	+5	+12.05
Recognition Equipment, Inc	103	48 1/2	101	103	92	+9	+9.78
Standard Computers	18 1/4	11 1/4	18	18 3/4	15 1/2	+2 1/2	+16.13
Systems Engineering Labs	22	14 3/4	22 3/4	23 1/4	21 1/2	+1 1/4	+5.81
University Computing Co	45 1/2	30 1/4	46 1/2	47 1/2	44 1/2	+2	+4.49

CORRECTION: Due to a clerical error, the value of computers in use by the Western Electric Co. was understated in our EDP 100 list (EDP I&MR, Feb. 10, 1967). The value of computers installed as of August 1966, by the Western Electric Co., Inc. was $50.8 million, making the firm the 11th largest industrial user of computers in the world. Western Electric's value of computers installed/$1000 sales was 15.11; value of computers/employee was $301; and value of computers/$1000 assets was 22.05. Please note these corrections in your copy of the EDP 100 list for 1966. We thank the people at Western Electric for bringing this correction to our attention.

May 4, 1967 Vol. 2, No. 22

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Monthly Computer Census . . . . . Page 6

E|D|P
INDUSTRY AND MARKET REPORT

A SEMI-MONTHLY NEWSLETTER FOR EXECUTIVES IN THE ELECTRONIC DATA PROCESSING INDUSTRY, AND THE FINANCIAL COMMUNITY.

P. J. McGovern, Editor
Telephone 617/332-8840

IT'S HAPPENED! IBM CONVERTS RETURNED 1401'S INTO LOW-COST CARD COMPUTERS; AT $1300/MO., NEW SYSTEM LIKELY TO HOLD OFF COMPETITORS IN SMALL BUSINESS MARKET

During the three years since IBM announced the 360, almost everyone in the computer industry has asked, at some time: "What is IBM going to do with all those returned 1401s?" About 9200 such systems are now installed. At least a partial answer has come with IBM's "quiet" (i.e., no news release) announcement of the 1401-H, a small computer system based on "re-engineered 1401 equipment."

This system has many interesting characteristics, not the least of which is its inflexible configuration: Memory size is restricted to 4K; memory cycle has been slowed from 11.5 usec. to 19.3 usec. by adjusting the pulse rate; it uses the same 1403 Mod 6 printer already in the 1400 line, and has a new 1402 Mod 6 card reader/punch with the same specs as the Mod 5 but renting for $20 more a month ($400 vs. $380). The system, which cannot be upgraded with tapes or with faster I/O peripherals, rents for a flat $1300 a month, about $500 a month less than the equivalent 1401-G with the same card processing rate. And it will far outperform tab equipment with the same rental.

But if you think this price drop will encourage customers and leasing companies to buy the 1401-H as a low-cost card computer, read on. The system's purchase price of $92,000 gives it a 70-to-1 purchase-to-lease ratio, over 40% higher than the basic 49-to-1 ratio common with most other computer equipment. The apparent strategy is: Stretch out the revenue-producing life of 1401s replaced by 360s, but avoid having customers make long-term commitments to 1401 technology when the baby business version of the 360, the 360/10, is expected to be introduced by mid-1968.

In addition to being an extra revenue producer, the 1401-H looks like an effective holding action against mounting competition in the small business computer market. The GE 115, the Honeywell 120, and the Univac 9200 card computers, priced at $1100 to $1800 per month, have been making effective inroads in this market. Up to now IBM could only offer these price-conscious customers a card 360/20 system at higher rental and with limited programming capability. Thus the low rental of the 1401-H system will get IBM commitments from new customers who can wet their feet in computer technology on a machine understood by thousands of computer personnel. IBM can therefore sell and service the customer now with people not yet retrained on its new product lines.

The clincher to the story is that deliveries begin next month, not next year . . . presumably as fast as 1401s are returned. It is expected that 1200 to 1500 will be returned by current customers this year, another 3000 to 3500 in 1968. Such a large number of low-cost card computers available from IBM should have a strong

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negative impact on leasing companies, such as MAI and DPA, which have heavy inventories of tab equipment. The 1401-H is priced at a level competitive to routine board-wired tabulators and calculators, and thus shortens the market life and depresses the comparative rental value of such equipment to the customer.

COLLEGE SPENDING FOR COMPUTERS SHOULD RISE TO OVER $400 MILLION PER YEAR BY 1972; GOVERNMENT WOULD FOOT MOST OF THE BILL UNDER PROPOSAL BY PRESIDENT'S STUDY GROUP

Greatly expanded sales of computers to the education market will result if a Presidential advisory group has its way.

Colleges and universities -- which will spend $60 million this year for computers and which have been increasing their budgets for computers 20% a year -- have been told they should increase this spending growth rate to 60% a year in order to reach an adequate spending support level of $60 per student per academic year by 1971-72. That's one of the recommendations in the report on Computers in Higher Education by the President's Science Advisory Committee. If the plan were implemented, spending for computer services at colleges would be $100 million for the 1968-69 school year, growing to $414 million a year by 1971-72.

"We believe that undergraduate education without adequate computing is deficient education, just as undergraduate education without adequate library facilities would be deficient education," the group says. It is "in the national interest to have adequate computing" at all institutions of higher learning by 1971-72. To do this, the group wants to bring all schools to the level that a few, such as Dartmouth College, have now achieved. The chief aim of the report is to estimate the cost for making up this academic deficit.

Findings and recommendations

The panel, headed by John R. Pierce of Bell Telephone Laboratories' Communications Sciences Div., has produced a well-documented and clearly written report that covers most facets of the computer's use in education. Its findings and recommendations include:

- Among undergraduates, about 35% need computers in a substantial portion of their courses, another 40% require limited computer use, and the remaining 25% could make use of computers in a few courses. Schools should cooperate with the Federal Government to provide all students with "computing service at least comparable. . . to that now available at the more pioneering schools."

- Cost is a major problem. The study group recommends that the government should provide 75% of the total cost for computers in education. This should include special grants during transitional periods, as well as annual funds for continuing service.

- Accounting practices have shifted research costs to educational users. The panel recommends this be remedied and it urges more Federal funds immediately for support of education and unsponsored research at institutions presently having the required facilities (emphasis theirs).

- "The cost of computing is a continuing expense, like light or water, rather than a capital investment, like the initial cost of buildings." Government agencies, therefore, should let schools apply funds either to purchase or rental of equipment or to purchase of service.

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- In many cases it is economical to supply service from large computing centers, and universities and the government should cooperate in "the immediate establishment of large central educational computing facilities capable of serving several institutions."

- Some universities have had trouble in determining and controlling their computer costs, so the panel recommends that schools "develop and use accounting procedures which accurately measure the cost and utilization of computer services."

In addition, the panel points out the need for expanded faculty training programs, for beefed up support in both research and education in computer sciences, for studies on how best to introduce computing into secondary education, and for information about the present and future number of people employed in the various portions of the computer field.

What is adequate service?

Providing adequate service is the main concern of the report. Its over-all cost, says the panel, is quite large but averages out to be about $60 per student per year. This, it says, is comparable to the $50 to $200 figure for college libraries and the estimated $95 per student for a single chemistry laboratory course in a four-year college.

In 1966, adequate college computing service consisted of four essentials: adequate instruction and consultation, adequate software, reliable operation, and fast turn-around time. And the study group estimates that in 1965 less than 5% of college students, and these at a few "favored schools," had access to adequate computing service. Looking ahead five years, the panel sees features available now being essential before 1971. These include: interactive remote consoles, audio output, visual displays, and new forms of input such as direct connections to experimental apparatus, character recognition scanning, and a light pen.

Estimating capacity and cost

During the period 1968 to 1972, says the panel, large time-sharing systems will come into use. These offer simple programming languages, and convenience, and are considered preferable to batch-processing for educational use. At Dartmouth, for example, "within two years after installing a time-sharing system, usage grew from essentially zero to the point where more than one-half of the students used the computer each quarter." Thus estimates are based on large time-shared centers.

On the average, 100 hours of console time per week will serve 200 students according to calculations in the report. Thus, a time-sharing system with 150 active consoles and operating 100 hours a week could serve 30,000 students. With the 1971-72 estimated enrollment of 5.5 million students in undergraduate degree-granting schools this would require 183 such centers, with an additional 40 centers for the expected two-year college enrollment of 1.2 million.

The report breaks the cost of this service down into three components: computing, at $45 per student; consoles, at $7 per student; and transmission, at $10 per student. Thus the cost of computer service in 1971-72 would be $340 million for four-year colleges and $74 million for two-year colleges.

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Transition

In what seems to be a realistic schedule, the panel outlines the expected progress toward its goal. During 1968-69, it expects 2 to 10 powerful, high-capacity time-sharing systems and 10 to 20 simpler and smaller ones to be in operation. In addition, between 80 and 120 colleges which now have large computing centers will have converted to larger, late-model equipment and at least 50 of them should be able to provide remote batch processing service to several hundred other colleges.

During the following academic year, says the report, some 20 to 40 other schools "should be capable of managing time-sharing systems," and by 1970-71 an additional 40 to 80 "will have caught up." The panel shows its realistic outlook as it says: "Thus, it appears to be possible to develop the competence to manage large centers of this sort at the same rate as which manufacturers will be able to deliver such systems during this period."

The level of spending must be increased, the report stresses. From about $60 million in 1967-68, it must be increased to $100 million, which "we believe to be attainable and efficiently usable in 1968-69." This would be divided as follows: $8 million for large time-sharing centers; $8 million for remote terminals hooked to batch-processing systems; $84 million for batch-processing centers.

The panel feels its goals can be met with about 4% increase in college operating budgets. Of course, the financial pressure on schools is already strong and growing, and "this is no mean feat in times of rising costs in all other areas of their operation." But the panel feels that a 1% rise is possible if the other 3% comes from the Federal Government.

In a sense, the case is summed up in the first sentence of the report: "After growing wildly for years, the field of computing now appears to be approaching its infancy." What the panel recommends is a plan by which the infant's growth can be witnessed, understood, and guided by the citizens who must live with it as it becomes a youth . . . and an adult.

Market implications

Interestingly, the dollar figures in the report do not take into consideration the sizable educational discounts which most computer manufacturers offer today. These "should be considered as outside educational support rather than reduced costs," it states. Thus, with such increased budgets available, computer sales to educational institutions can be potentially quite profitable for manufacturers that can supply the proper equipment.

The report indicates that 70 to 120 large time-sharing systems should be operational within five years. Based on the report's estimates that annual equipment rentals will be $1.5 million for each such system ($6 million purchase), the market would be $420 million to $720 million . . . a potential windfall for manufacturers of large computers.

Systems which would seem to be challengers during the first few years of this buildup in university computing power are the Burroughs 8500, the CDC 6000 series, the GE 600 series, and the Univac 1108. IBM, with its troubles and restricted marketing emphasis on the 360/67, would appear to be in a poor position, but it can hardly be expected to ignore a market this large for too long a time.

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PLANS FOR DATA NETWORK BROADENS OPPORTUNITY FOR WESTERN FIRMS IN EASTERN EUROPE

East Germany's disclosure of its plan for a nationwide data network involving several hundred computers drew throngs of exhibitors -- including some from Britain and the United States -- to the Leipzig Spring Fair. Usually a quiet prelude to the Hannover Messe (Fair) in West Germany, the Leipzig gathering this year underwent a renaissance and effectively marked the opening of the East German market to Western computer manufacturers.

Control Data took this opportunity to introduce two computer models, the 2100 and the 2300, specifically designed for trade with Eastern Bloc nations. The new systems are compatible with CDC's 3000 series, but their central processors have been slowed down to meet Commerce Dept.'s requirements concerning exports to Eastern Europe. CDC has announced no plans to market the two machines outside the Communist Bloc, presumably because the systems cost CDC as much to produce and market as their higher performance relatives.

These machines, however, aren't expected to fit into the East German network in which, says FDR's EDP Secretary of State Gunther Kleiber, all major industrial plants and research institutes will have data transmission links with Government data processing centers and consultants. Goal of the system, which is to be fully operational by 1970, is complete economic control and regulation.

Most of the computers in the system will be East German Robotron 300's; the remainder will be imported. There's no official word, but odds are they'll come from the West . . . probably from Britain where the Board of Trade will not restrict speed and capacity. ICT is the likely supplier, since EELM's System 4 -- based on RCA Spectra 70 patents -- is restricted by U.S. trade regulations.

Also, Elliott, the only British supplier to East Germany at present, will probably share in the network with its process control computers of the ARCH type, three of which are already operating in East Germany. At the Leipzig Fair, in fact, one of the major attractions for the thousands of visitors was the gold-medal-winning ARCH 102 process control system. And before the fair closed, Elliott had booked a 102 order for use in the East German chemical industry. No delivery date was announced, but in the United Kingdom a late fall delivery was scheduled for such organizations as the Central Electricity Generating Board's Fawley plant and the Lee Valley Water Co.'s Barnet Division.

ICT already has a foothold in the East German network. On order from Carl Zeiss, Jena, is ICT's 1907 with twelve magnetic tape drives, CRT display units, a plotter, and data terminals. This is the largest Western computer system yet to be ordered by an Eastern European organization. It is scheduled to be integrated into the data network.

The idea of a nationwide data network is appearing in many Communist Bloc nations. In 1966, Bulgaria announced plans for a network of 20 local government centers, built around ICT's 1900 series. And the first of these, a 1904, is scheduled for July delivery to the city of Russe. Recently, however, Bulgaria has ordered some 20 of the small Facom 230/20 machines from Japan's Fujitsu and there is no comment as to whether this order represents a change or an extension of the original plan. Similar ideas for a data network have been expressed in Russia, but opposition is reportedly strong and no definite plan has been announced. To date, the East German plan appears by far the most ambitious and broadly based of any Communist project and large enough to whet appetites of computer makers in the west.

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MONTHLY COMPUTER CENSUS

THE NUMBER OF ELECTRONIC COMPUTERS INSTALLED OR ON ORDER AT ANY ONE TIME HAS BEEN INCREASING RAPIDLY DURING THE PAST SEVERAL YEARS. NEW MODELS HAVE BEEN OFFERED IN THE COMPUTER MARKET, AND FAMILIAR MACHINES HAVE GONE OUT-OF-PRODUCTION AND SUBSEQUENTLY BEEN RETIRED FROM ACTIVE USE AND DISMANTLED. SOME NEW COMPUTERS HAVE BEEN RECEIVED WITH OPEN ARMS BY USERS -- OTHERS HAVE BEEN GIVEN THE COLD SHOULDER.

TO AID OUR READERS IN KEEPING UP WITH THIS RAPIDLY CHANGING PROFILE OF COMPUTER USE, EDP I&MR PRESENTS THIS MONTHLY REPORT ON THE NUMBER OF GENERAL PURPOSE ELECTRONIC DIGITAL COMPUTERS MADE BY U.S.-BASED COMPANIES WHICH ARE INSTALLED OR ON ORDER AS OF THE PRECEDING MONTH. THESE CENSUS FIGURES INCLUDE INSTALLATIONS AND ORDERS OUTSIDE THE UNITED STATES. THE FIGURES ARE COMPILED AND UPDATED EACH MONTH BY THE INTERNATIONAL DATA CORPORATION, NEWTONVILLE, MASS., A MARKET RESEARCH FIRM SPECIALIZING IN THE INFORMATION PROCESSING INDUSTRY AND THE PUBLISHER OF THE EDP I&MR. WE HOPE THEY WILL SERVE AS A USEFUL "BOX-SCORE" OF PROGRESS FOR READERS INTERESTED IN FOLLOWING THE GROWTH OF THE U.S. COMPUTER INDUSTRY AND OF THE COMPUTING POWER IT BUILDS.

IN GENERAL, MANUFACTURERS IN THE COMPUTER FIELD DO NOT OFFICIALLY RELEASE INSTALLATION AND ON-ORDER FIGURES. THE FIGURES IN THIS CENSUS ARE DEVELOPED THROUGH A CONTINUING MARKET SURVEY CONDUCTED BY THE INTERNATIONAL DATA CORPORATION. THIS MARKET RESEARCH PROGRAM COMPILES AND MAINTAINS A WORLDWIDE COMPUTER INSTALLATION LOCATOR FILE WHICH IDENTIFIES, BY CUSTOMER, THE INSTALLATION SITES OF ELECTRONIC COMPUTERS. THE RESULTING CENSUS COUNTS ARE SUBMITTED TO INDIVIDUAL COMPUTER MANUFACTURERS FOR THEIR REVIEW AND VOLUNTARY CONFIRMATION.

COMMENTS ON THIS CENSUS FROM INFORMED READERS WILL BE WELCOMED.

AS OF APRIL 10, 1967

NAME OF MANUFACTURER	NAME OF COMPUTER	SOLID STATE?	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS	NUMBER OF UNFILLED ORDERS
Advanced Scientific Instruments	ASI 210	Y	$3850	4/62	26	X
	ASI 2100	Y	$4200	12/63	7	X
	ADVANCE 6020	Y	$4400	4/65	14	13
	ADVANCE 6040	Y	$5600	7/65	8	12
	ADVANCE 6050	Y	$9000	2/66	7	9
	ADVANCE 6070	Y	$15,000	10/65	5	6
	ADVANCE 6130	Y	$1000	2/67	8	22
Autonetics	RECOMP II	Y	$2495	11/58	33	X
	RECOMP III	Y	$1495	6/61	7	X
Bunker-Ramo Corp	BR-130	Y	$2000	10/61	160	X
	BR-133	Y	$2400	5/64	36	32
	BR-230	Y	$2680	8/63	15	X
	BR-300	Y	$3000	3/59	33	X
	BR-330	Y	$4000	12/60	29	X
	BR-340	Y	$7000	12/63	20	X
Burroughs	205	N	$4600	1/54	40	X
	220	N	$14,000	10/58	32	X
	B100	Y	$2800	8/64	180	9
	B200 Series	Y	$5400	11/61	600	8
	B300 Series	Y	$10,000	7/65	148	73
	B2500	Y	$5000	2/67	3	55
	B3500	Y	$14,000	5/67	0	52
	B5500	Y	$22,000	3/63	67	9
	B6500	Y	$33,000	2/68	0	14
	B8500	Y	$200,000	2/67	0	4
Control Data Corporation	G-15	N	$1600	7/55	280	X
	G-20	Y	$15,500	4/61	25	X
	LGP-21	Y	$725	12/62	160	X
	LGP-30	semi	$1300	9/56	133	X
	RPC-4000	Y	$1875	1/61	64	X
	160*/160A/160G	Y	$2100/$5000/$12,000	5/60;7/61;3/64	462	X
	924/924A	Y	$11,000	8/61	28	X
	1604/1604A	Y	$45,000	1/60	59	X
	1700	Y	$3500	5/66	60	178
	3100/3150	Y	$10,000	12/64	98	25
	3200	Y	$14,000	5/64	66	X
	3300	Y	$19,500	9/65	60	50
	3400	Y	$18,000	11/64	19	X
	3500	Y	$30,000	9/67	0	10
	3600	Y	$48,000	6/63	45	X
	3800	Y	$49,300	2/66	18	13
	6400	Y	$52,000	5/66	13	22
	6600	Y	$117,000	8/64	24	17
	6800	Y	$130,000	4/67	0	2
Data Machines, Inc.	620	Y	$900	11/65	54	12
	620I	Y	$500	4/67	0	38
Digital Equipment Corp.	PDP-1	Y	$3400	11/60	59	X
	PDP-4	Y	$1700	8/62	55	X
	PDP-5	Y	$900	9/63	115	X
	PDP-6	Y	$10,000	10/64	24	1
	PDP-7	Y	$1300	11/64	128	26
	PDP-8	Y	$525	4/65	700	170
	PDP-9	Y	$1000	12/66	6	64
	PDP-10	Y	$7500	7/67	0	14
Electronic Associates, Inc.	8400	Y	$12,000	6/65	18	9
General Electric	115	Y	$1800	12/65	310	600
	205	Y	$2900	6/64	42	X
	210	Y	$16,000	7/59	47	X
	215	Y	$6000	9/63	54	X
	225	Y	$8000	4/61	202	X
	235	Y	$10,900	4/64	73	5
	415	Y	$9600	5/64	215	55
	425	Y	$18,000	6/64	82	42
	435	Y	$25,000	9/65	25	15
	625	Y	$50,000	4/65	22	16
	635	Y	$56,000	5/65	21	17
	645	Y	$90,000	7/66	2	9
Honeywell	DDP-24	Y	$2500	5/63	87	X
	DDP-116	Y	$900	4/65	180	44
	DDP-124	Y	$2050	3/66	36	34
	DDP-224	Y	$3300	3/65	56	8
	DDP-516	Y	$700	9/66	45	160
	H-120	Y	$3900	1/66	430	300
	H-200	Y	$8400	3/64	1060	140
	H-400	Y	$8500	12/61	101	X

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NAME OF MANUFACTURER	NAME OF COMPUTER	SOLID STATE?	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS	NUMBER OF UNFILLED ORDERS
Honeywell (cont'd)	H-800	Y	$28,000	12/60	90	1
	H-1200	Y	$8000	2/66	92	100
	H-1400	Y	$14,000	1/64	12	X
	H-1800	Y	$42,000	1/64	20	1
	H-2200	Y	$12,000	1/66	36	62
	H-4200	Y	$20,500	4/67	0	9
	H-8200	Y	$35,000	4/68	0	5
IBM	305	N	$3600	12/57	125	X
	360/20	Y	$2000	12/65	2550	6800
	360/30	Y	$7500	5/65	3900	4400
	360/40	Y	$15,000	4/65	2000	1800
	360/44	Y	$10,000	7/66	50	200
	360/50	Y	$26,000	8/65	300	700
	360/65	Y	$50,000	11/65	60	260
	360/67	Y	$75,000	10/66	7	50
	360/75	Y	$78,000	2/66	20	38
	360/90 Series	Y	$140,000	6/67	0	10
	650	N	$4800	11/54	152	X
	1130	Y	$1200	2/66	1400	4600
	1401	Y	$6600	9/60	7650	X
	1401-G	Y	$2300	5/64	1610	X
	1410	Y	$14,200	11/61	815	50
	1440	Y	$4800	4/63	3500	190
	1460	Y	$11,500	10/63	1700	X
	1620 I, II	Y	$4000	9/60	1660	90
	1800	Y	$7600	1/66	160	350
	701	N	$5000	4/53	1	X
	7010	Y	$22,600	10/63	216	5
	702	N	$6900	2/55	7	X
	7030	Y	$160,000	5/61	6	X
	704	N	$32,000	12/55	27	X
	7040	Y	$22,000	6/63	120	6
	7044	Y	$32,000	6/63	130	8
	705	N	$38,000	11/55	48	X
	7070, 2, 4	Y	$27,000	3/60	315	X
	7080	Y	$55,000	8/61	85	X
	709	N	$40,000	8/58	8	X
	7090	Y	$63,500	11/59	44	X
	7094	Y	$72,500	9/62	105	1
	7094 II	Y	$78,500	4/64	138	4
National Cash Register Co.	NCR-304	Y	$14,000	1/60	24	X
	NCR-310	Y	$2500	5/61	15	X
	NCR-315	Y	$8500	5/62	435	122
	NCR-315- RMC	Y	$12,000	9/65	63	44
	NCR-390	Y	$1850	5/61	500	25
	NCR-500	Y	$1500	10/65	1200	850
Philco	1000	Y	$7010	6/63	16	X
	2000-210, 211	Y	$40,000	10/58	16	X
	2000-212	Y	$52,000	1/63	12	X
Radio Corporation of America	RCA 301	Y	$7000	2/61	642	1
	RCA 3301	Y	$17,000	7/64	73	3
	RCA 501	Y	$14,000	6/59	96	X
	RCA 601	Y	$35,000	11/62	5	X
	Spectra 70/15	Y	$4100	9/65	100	130
	Spectra 70/25	Y	$6700	9/65	62	54
	Spectra 70/35	Y	$10,400	1/67	22	140
	Spectra 70/45	Y	$17,400	11/65	64	110
	Spectra 70/55	Y	$40,500	11/66	3	15
Raytheon	250	Y	$1200	12/60	175	X
	440	Y	$3500	3/64	17	1
	520	Y	$3200	10/65	23	5
Scientific Control Corporation	650	Y	$500	5/66	11	7
	655	Y	$1800	10/66	1	2
	660	Y	$2000	10/65	2	1
	670	Y	$2600	5/66	1	2
	6700	Y	$30,000	10/67	0	1
Scientific Data Systems, Inc.	SDS-92	Y	$1500	4/65	95	65
	SDS-910	Y	$2000	8/62	210	50
	SDS-920	Y	$2900	9/62	155	40
	SDS-925	Y	$3000	12/64	40	35
	SDS-930	Y	$3400	6/64	210	50
	SDS-940	Y	$10,000	4/66	13	28
	SDS-9300	Y	$7000	11/64	32	13
	Sigma 2	Y	$1000	12/66	12	200
	Sigma 5	Y	$6000	8/67	0	22
	Sigma 7	Y	$12,000	12/66	7	27
Systems Engineering Labs	810	Y	$1000	9/65	24	X
	810A	Y	$900	8/66	22	14
	840	Y	$1400	11/65	4	X
	840A	Y	$1400	8/66	6	34
UNIVAC	I & II	N	$25,000	3/51 & 11/57	24	X
	III	Y	$20,000	8/62	69	X
	File Computers	N	$15,000	8/56	14	X
	Solid-State 80I,II 90 I, II & Step	Y	$8000	8/58	228	X
	418	Y	$11,000	6/63	114	36
	490 Series	Y	$35,000	12/61	150	56
	1004	Y	$1900	2/63	3200	50
	1005	Y	$2400	4/66	650	200
	1050	Y	$8000	9/63	285	20
	1100 Series (except 1107)	N	$35,000	12/50	9	X
	1107	Y	$55,000	10/62	35	X
	1108	Y	$65,000	9/65	48	74
	9200	Y	$1500	6/67	0	950
	9300	Y	$3400	6/67	0	550
	LARC	Y	$135,000	5/60	2	X
				TOTALS	45,736	26,181

X = no longer in production.

* To avoid double counting, note that the Control Data 160 serves as the central processor of the NCR 310. Also, customers ordering a new computer model intended to replace a computer model in the same product line may continue to use much of their current peripheral equipment, which can account for 30-70% of the value of the total computer system.

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STOCK MARKET REPORT ON SELECTED EDP FIRMS

April 10 - April 28, 1967

	1967 High	1967 Low	3 weeks Sales in 100's	3 weeks High	3 weeks Low	Last	3 weeks Net Change	3 weeks % Change
NEW YORK STOCK EXCHANGE								
Addressograph-Multigraph	59 1/4	46 7/8	2338	56 1/8	46 7/8	55 3/4	+ 6 1/2	+13.20
American R & D	95 1/2	37 3/4	1122	93 3/8	78 1/2	89	+ 9 1/2	+11.95
Ampex Corp.	32 3/4	22 3/4	6300	30 3/8	28 1/8	29 3/4	+1/4	+ 0.85
Burroughs	129 7/8	80 7/8	4619	129 7/8	110 1/2	128 3/8	+13 1/4	+11.51
Collins Radio	84	53	3340	84	68 3/8	82 1/8	+10 3/4	+15.01
Control Data	85 1/4	33 1/2	11,541	85 1/4	58 1/4	81 1/8	+21	+34.93
Electronic Assoc.	27 1/8	16 3/4	1491	22 7/8	19 5/8	21 1/2	+7/8	+ 4.24
General Electric	95	82 1/2	5608	95	84 3/8	94 7/8	+ 9	+10.48
Honeywell	88 1/4	63 1/2	2616	82 1/4	72	77 1/2	- 4 7/8	- 5.92
IBM	499	362 1/2	1650	499	439 3/4	483 1/4	+36 5/8	+ 8.20
Inter. Tel & Tel.	96 1/4	72 1/2	2047	96 1/4	89	93	+ 3 3/4	+ 4.20
Litton	108 3/8	79 1/2	3251	108 3/8	96 3/8	107	+ 6 7/8	+ 6.87
Nat. Cash Reg.	97 3/4	67 1/8	2366	97 3/4	85 1/4	94 1/4	+ 2 7/8	+ 3.15
RCA	55 1/2	42 5/8	11,465	55 1/2	45	54 5/8	+ 8 5/8	+18.75
Raytheon	69 5/8	49	2348	68 7/8	63	67 1/2	+ 1 1/2	+ 2.27
Sanders	89 7/8	53 1/4	1904	89 7/8	76 5/8	86	+ 7 5/8	+ 9.73
Scientific Data	117 1/4	63 7/8	3694	117 1/4	92 1/8	110 5/8	+15 7/8	+16.75
SCM	79 1/4	52 5/8	5725	70 3/4	61 1/2	67 1/4	+ 4 1/2	+ 7.17
Singer	60 3/8	45	2048	60 3/8	57 3/4	60 1/4	+ 1 1/8	+ 1.90
Sperry Rand	36	28 1/8	12,029	33 1/8	30 1/2	31 7/8	+ 1 1/8	+ 3.66
Teledyne	169 7/8	80 1/8	3014	169 7/8	130 1/4	168 1/8	+31	+22.61
NYSE COMPUTER STOCK AVERAGE							+8.94	+ 9.60
AMERICAN STOCK EXCHANGE								
ANelex	19 3/8	11 1/2	1099	19	14 1/2	17 3/4	+ 3	+20.34
Audio Devices, Inc.	30 3/8	21 5/8	812	29 5/8	25 1/4	27 1/4	+1/4	+ 0.93
Bunker-Ramo	12 1/4	7 1/2	1828	11 1/8	10	10 1/2	-1/8	- 1.18
Cal Comp	79	29 1/8	1458	79	57 1/8	76 3/4	+16 3/4	+27.92
Clary	8 1/2	4 1/8	699	8 1/8	7 1/8	7 1/4	-1/8	- 1.69
Computer Applications	24 3/4	14	2838	24 3/4	17 1/8	22 1/4	+ 4 7/8	+28.06
Computer Sciences	45 5/8	20 3/4	1261	45 5/8	39 1/4	44 1/4	+ 3 7/8	+ 9.60
Digital Equipment	71 3/4	29 3/8	1160	71 3/4	59 1/8	67 5/8	+ 7 1/8	+11.18
Leasco	76 7/8	33 5/8	1624	76 7/8	58 3/8	70 1/2	+11 1/2	+19.49
Levin-Townsend Computer Corp.	46 7/8	10 7/8	4155	46 7/8	31	41 1/4	+10 1/8	+32.53
Milgo Electronics	9 5/8	5 1/8	1182	9 5/8	5 3/4	8 7/8	+ 2 3/8	+36.54
Planning Research	34 1/4	19 5/8	1063	34 1/4	25 5/8	31	+ 4 1/2	+16.98
Potter Instrument	22 1/4	12 3/8	3552	22 1/4	16 1/8	21 3/8	+ 3 7/8	+22.14
AMEX COMPUTER STOCK AVERAGE							+ 5.23	+17.14

	1967 High Bid	1967 Low Bid	April 28 Bid	April 28 Asked	3 weeks ago Bid	3 week Net Chg. Bid	3 week % Change Bid
OVER-THE-COUNTER							
Applied Data Research, Inc.	6 3/4	3 1/8	5 3/4	6 1/4	5	+3/4	+15.00
Aries Corp.			16 5/8	17 1/8	12 1/2	+4 1/8	+33.00
Automatic Data Processing	38 1/2	23 1/2	37	38	31 3/4	+5 1/4	+16.53
Bolt, Beranek & Newman, Inc.	15 1/2	8 1/4	15 1/4	15 3/4	13 1/8	+2 1/8	+16.19
C-E-I-R	14 1/4	6 5/8	12 5/8	12 7/8	10 3/4	+1 7/8	+17.44
Computer Usage	44 1/2	20 1/2	41 1/2	43	39	+2 1/2	+ 6.41
Cyber-tronics	17 1/2	4 3/4	14 1/4	15	9 1/2	+4 3/4	+50.00
Data Products	10 1/8	2 1/2	9 1/2	9 3/4	8	+1 1/2	+18.75
Digitronics	12 3/4	6	12	12 3/8	12	---	---
Documentation, Inc.	9 3/4	3 3/4	9 1/2	9 5/8	8	+1 1/2	+18.75
DPA, Inc.	16 1/4	4 1/4	14 1/2	15	10 3/4	+3 3/4	+34.88
Electronic Memories	23 3/4	12 3/4	23 3/4	24 1/2	17 1/2	+6 1/4	+35.71
Fabri-Tek	11 3/4	6	11 1/4	11 3/4	8 1/2	+2 3/4	+32.35
G-C Computer	28	10 1/4	26 3/4	27 1/2	23	+3 3/4	+16.30
Informatics, Inc.	22 1/2	7 1/2	22 1/2	24	18 1/2	+4	+21.62
Management Assistance	21 1/2	13 5/8	16 7/8	17 1/4	16	+7/8	+ 5.47
Memorex	118	63	118	120	89 1/2	+28 1/2	+31.84
Mohawk Data Sciences	80	32	73	74 1/2	64	+9	+14.06
Randolph Computer Corp.	57	14 3/4	54	56	46 1/2	+7 1/2	+16.13
Recognition Equipment, Inc.	131	48 1/2	119	122	101	+18	+17.82
Standard Computers			19 1/4	20	18	+1 1/4	+ 6.94
Systems Engineering Labs			24 1/2	25 1/4	22 1/2	+2	+ 8.89
University Computing Co.			68	70	46 1/2	+21 1/2	+46.24

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May 31, 1967 Vol. 2, No. 23

E|D|P
INDUSTRY AND MARKET REPORT

A SEMI-MONTHLY NEWSLETTER FOR EXECUTIVES IN THE ELECTRONIC DATA PROCESSING INDUSTRY, AND THE FINANCIAL COMMUNITY.

P. J. McGovern, Editor
Telephone 617/332-8840

AIR FORCE STANDS ITS GROUND AMID GROWING COMPLAINTS OVER SELECTION OF IBM; CHANGES IN ATTITUDE TOWARD MARKETING COMPUTERS TO UNCLE SAM COULD RESULT

Feathers are still flying over the Air Force's selection of IBM to furnish the 100 or more computers for Phase II, the USAF Base Level Data Automation Standardization Program (EDP I&MR, Apr. 13,'67). The controversy is by no means ended, and it looks as if, for once, the "other" computer manufacturers are not going to take the decision lying down. Some rather strong moves have been made.

The three computer manufacturers that bid and lost -- Burroughs, Honeywell, and RCA -- have expressed their displeasure to Air Force Secretary Harold Brown, and RCA has "formally protested" to the AF Secretary. Honeywell, after Chairman James H. Binger talked with Brown, has filed a formal protest with the Comptroller General of the United States, who heads the General Accounting Office which rides herd on all government spending.

And more direct action is eminent: RCA reportedly may slash the size of its Washington, D.C., AF EDP office to a one-man operation, and Honeywell says it must "seriously consider the value of entering future Air Force data-processing competitions" if they are going to be carried out like the one for Phase II. This may sound like the proverbial "cutting off the nose . . ." but it reflects the extreme concern over the implications of Phase II throughout the computer industry. Says a top executive of a manufacturer that wasn't in the competition: "If this is a sign of the way things are going to be, if this means that IBM can get any contract it wants by simply applying all its muscle, then we've got to do some hard thinking about future government marketing plans."

Indeed, Congress may be asking some hard questions about IBM's selection in this particular case. Rep. Jack Brooks, who heads the Government Efficiency Subcommittee of the House Operations Committee, has asked for a "complete rundown" from manufacturers and the Air Force. And two senators from Minnesota, the state in which Honeywell, Inc. is headquartered, have entered the act. Democrats Eugene McCarthy and Walter Mondale held a meeting that brought together Honeywell executives, Assistant Air Force Secretary Leonard Marks, who announced the selection of IBM, other AF officials, and an attorney from the GAO. The senators subsequently have urged that the Air Force reject all bids and start all over. Sen. McCarthy says: "I think the Air Force has engaged in some bad procedures that could cost the taxpayers millions of dollars. Something is wrong with a competition if three out of four bidders are disqualified."

E | D | P Industry and Market Report is published twenty-four times each year by the International Data Publishing Co., P. O. Box 1, Newtonville, Mass. 02160. Entire contents ©, 1967 by the International Data Corporation. Editorial contributions are gathered from numerous industry experts, and are researched and prepared by members of our editorial staff. The information and opinions contained in this issue are based on the best information available to us, but their accuracy and completeness cannot be guaranteed. Subscriptions: One Year, $49.50; Six Months, $29.

Questions and answers

Price is the big point of contention. Competitors say that IBM's system might cost nearly twice as much as that of the lowest bidder . . . about $50 million more of the taxpayer's money. And this figure is used by most of the critics. For its part, however, the Air Force says "this point has been highly distorted."

The Air Force, in fact, has issued a statement that describes the selection process and is an "attempt to clear the air on the issues involved." In a nutshell, the statement from Marks' office says that IBM was the only vendor to meet all the requirements and that its price wasn't too high:

> Of the four vendors who proposed and demonstrated their equipment, only IBM successfully demonstrated that his [sic] equipment and software configuration could process the Air Force workload within the 200 hours as required . . . some aspect of the mandatory requirements could not be met by each of the other vendors . . . The life of the system under consideration extends for six years and envisions a rising workload over that time period . . . The overall cost of the IBM proposed system was reasonable in the light of other proposals . . . We found that the cost difference between IBM and a losing vendor was not of significant magnitude.

This difference, Dr. Marks later explained, was a "very few" million dollars. The Air Force, in its "cost-effectiveness" evaluation, attempted to estimate the total costs of the system over a six-year period. This included calculations of maintenance, operating costs, and equipment additions to satisfy future requirements. All the facts on this process have not been revealed, and losing bidders have raised questions about the Air Force's methods.

The Air Force explains

In a "hypothetical" example of the Air Force procurement procedure, prepared for a meeting of the Diebold Research Group in Washington, the Air Force compared a $70 million system and a $120 million system. These figures just happen to be those commonly thought to have been bid by Honeywell and IBM respectively. In the example, the Air Force talked about a system that had to do its job in 250 hours a month (the actual RFP required 200 hours) and it estimates costs over a five-year life cycle (the actual evaluation, says the AF, was for a six-year lifetime).

The first system, the example states, exceeded the time limitation while the second had time to spare. Also, in this analysis, the Air Force says that the more expensive system would require additional expense of only $1.3 million while the other would need $25 million of additional equipment and $24 million more in maintenance and operating expenses. Thus, the systems had roughly the same costs and the more expensive one was more productive. If this reflects the actual situation, the Air Force has a good argument; but the losing bidders say this isn't the case.

The Air Force has also answered complaints from the three losers that they were not given sufficient time to adjust proposed systems to meet mandatory requirements: "We are talking about equipment that is available off-the-shelf . . . We believe that it would be patently unfair to allow vendors to repair a proposal after live test demonstrations since the very purpose of these demonstrations is to prove that the system proposed meets the conditions of the Request for Proposal." (Emphasis theirs.)

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Thus, the Air Force stands its ground. It says it has answered letters received from the losing vendors and is prepared to submit all necessary information to the GAO if it should request it in the course of its action on Honeywell's protest. But the losers don't think the situation is so cut and dry. The essence of their argument is that the discrepencies which made them non-responsive were very minor and could have been corrected at little or no cost. They also argue that, in analyzing the system cost through its six-year life cycle, the Air Force perhaps didn't consider such things as the technical improvements that would naturally de-develop or a growth rate of more than 10% a year (as used in the "hypothetical" example). Could slightly greater growth, critics ask, mean much larger system cost?

The two Minnesota senators have made statements that dig right into the heart of the situation . . . the apparent paradox in the award. Congressmen, they say, must battle to obtain appropriations of $10 million or even $1 million for such things as rent subsidies. Therefore, they cannot permit to go unchallenged the $50 million "low bidder-to-IBM" price differential, especially when the Air Force's decision rejected other bids on "some very technical grounds." The senators have heard, and are dissatisfied with, the Air Force's answers.

The way things are

So that's the way it is. The losing bidders have complained, the Air Force stands with its decision which it believes "to be reasonable and just," the GAO and some members of Congress are examining the situation, and IBM plans to deliver the first two systems this summer.

The Air Force, in its recent statement, quotes EDP I&MR as describing the Request for Proposal as "one of the most thorough and well-thought-out system descriptions in history." We do believe this is true. The question in dispute, however, is whether the responses by the computer manufacturers to the Request for Proposal were evaluated fairly.

Every interested party, by now, has been heard from. And the drama, as it continues, will be staged behind closed doors in a slow, legalistic, governmental manner . . . with bursts of publicity -- self-serving and otherwise -- popping up at fairly regular intervals. But months will pass before anything definite happens, if indeed it ever does.

We seriously doubt that the Air Force's decision will be changed. If the Department of Defense could stand firm during something as large as the TFX controversy, it can hardly be expected to budge in the present case. Nor is this a major disaster. The computer industry will not disintegrate because IBM was selected to supply equipment for Phase II. There are, however, questions that must be answered if the computer industry is to have a feeling of confidence in government evaluation of computer systems. The important concept of true competitive bidding is at stake in this case.

HONEYWELL, NOT CONTENT WITH TACKLING THE AIR FORCE (SEE STORY ABOVE) HAS CHALLENGED THE VALIDITY OF THE BASIC ENIAC PATENT WHILE SPERRY RAND, PATENT HOLDER, HAS SUED HONEYWELL FOR PATENT INFRINGEMENT. THE TWO ACTIONS, SAID TO HAVE BEEN TAKEN INDEPENDENTLY, MAY WELL BE MORE THAN THE TYPICAL CROSS-SUIT SITUATION THAT USUALLY LEADS TO AN OUT-OF-COURT SETTLEMENT. HONEYWELL SAYS ITS CIVIL ANTITRUST LAWSUIT ASKS RECOVERY OF DAMAGES IN ADDITION TO A DECLARATORY JUDGEMENT. SPERRY SAYS HONEYWELL'S COMPLAINT, FOR THE MOST PART, HAS ALREADY BEEN ADJUDICATED IN ITS FAVOR. SPERRY HAS ALREADY CROSS LICENSED EDP PATENTS WITH IBM. EDP I&MR WILL COVER DETAILS NEXT ISSUE.

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MOHAWK DATA SCIENCES TURNS PROFITABLE AS SALES SOAR

"Build a better mousetrap and the world will beat a path to your door."

This well-worn phrase has proved true again in the case of Mohawk Data Systems and its product, the Data-Recorder. The one-of-a-kind product directly transcribes data from a keyboard to standard magnetic tape. Therefore, the data processing installation that uses this product can eliminate its keypunches, its verifiers, and its ceiling-high inventory of punched cards.

And computer installations are finding this out. In July of 1965, when the company was 10 months old, Mohawk had almost 200 of its machines out in the field. Today, over 4000 are in operation and the backlog stands at about 2200. Currently, Mohawk is shipping about 100 machines a week and by the end of June, when a 75,000 square-foot addition is completed, its production capacity will be increased by at least 50% to 75%.

Also, in a relatively short time, the product is beginning to make money for its manufacturer. During the fiscal year that ended July 31, 1966, Mohawk lost nearly $829,000 on income of $2.4 million. It doesn't have a projection for the current year, but for the nine months just ended it has reported earnings of over $589,000 on sales and rental income of almost $6 million. One reason for Mohawk's rapid move into profitability is a five-year agreement with National Cash Register for the purchase of at least 1000 Data-Recorders a year. As a result, only about two thirds of Mohawk's machines are on rental . . . a low ratio when compared to the high percentage of rentals that has traditionally been the case for punched card preparation equipment. Indeed, 90% of Mohawk's domestic shipments (exclusive of those to NCR) are to rental customers.

NCR receives a "substantial distributors discount," markets the equipment under its own label, and is responsible for sales, service, and operator training. Currently, sales to NCR account for about 25% of Mohawk's production, and the company is committed to purchase at least 250 machines each quarter if it wants to keep its exclusive right to the distribution of Mohawk equipment.

Many of these facts come from a prospectus, issued early in May, in which the company offered 100,000 additional shares to the market at $79.00. Over-the-Counter prices of Mohawk's stock have dropped slightly since the offering, and several investment analysts consider the issue a good buy at present levels.

Mohawk is not protected by basic patents on its Data-Recorders; however, it "does not know of any single device presently produced that is comparable to the 1101," its basic machine. The company has developed considerable technical know-how in the manufacture and assembly of its products and feels that it therefore has a competitive margin. Also, its biggest potential competitor -- IBM -- is unlikely to enter the market at this time because it would be primarily selling against its own key-punches and verifiers . . . most of which is on rental but fully or nearly fully depreciated.

About half of Mohawk's backlog is for the 1101, the original model that the company says is suitable for use with over 90% of the magnetic tape computers presently on the market. The exact efficiency or advantage of the product is hard to measure since it depends on how much information is being punched onto cards, into what format the data is being entered, and other factors. Tape prepared on the Data-Recorder, however, doesn't have to be processed through a computer, and Mo-

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hawk says the machine was designed "to permit information from source documents to be prepared for computer use at greater speed and at lower cost than permitted by existing methods and procedures."

Other models in the line include automatic card converters, devices for typing a hard copy while recording data on magnetic tape, data transmission and receiving equipment, list printers, paper tape converters, and various combinations of these. It also recently introduced a series of buffered line printers. At present, according to reports, about one-third of the equipment on order will be used in some data communication mode.

Customers sampled by EDP I&MR are delighted with the Mohawk machines. Typical comment is: "We got one to try it out, and now we have our second with several more on order." Indeed, Mohawk reports that a majority of the customers have two or more of its units and that several, particularly those with more than one division, have 50 or more.

COMPUTER LEASING COMPANIES ACQUIRE FIRMS WITH SERVICE AND SOFTWARE INTERESTS

As more and more computer users consider third-party leasing, the companies that supply this lower-cost approach to computer use are also growing . . . recently, in fact, it seems the leasing companies are limited only by available capital. Now, however, several leasing firms are also taking to horizontal growth into software and services. During February, Leasco acquired Documentation, Inc., a $7 million company in the computer systems field. And during the last ten days of May, three more similar acquisitions have taken place:

> "NEW YORK, N.Y., May 19 -- Randolph Computer Corporation finalized the agreement effective May 18 for the acquisition of United Data Processing, Inc., John M. Randolph, president, Randolph Computer and James O. Powell, president, United Data Processing, announced."
>
> "GREAT NECK, N.Y., May 22 -- Saul P. Steinberg, president of Leasco Data Processing Equipment Corporation, announced today the acquisition of Fox Computer Services."
>
> "NEW YORK, N.Y., May 31 -- Levin-Townsend Computer Corporation (ASE) has made a $500,000 investment in Realtime Systems, Inc. by purchase of convertible and other debt securities from Realtime and purchase of common stock from Loeb, Rhoades & Co., it was announced today by Howard S. Levin, president of Levin-Townsend, and Dr. Robert S. Davis, president of Realtime."

Thus, all three of these major leasing companies have moved further toward establishing a broad base in the "fringes" of the computer industry . . . such areas as leasing, systems development, service bureau and time-sharing operations that have so much promise of expansion in the years ahead. Here's where these companies now stand:

Leasco, which is a heavy leasor of non-IBM equipment, is working on a "computer software penetration program." In its prime business of leasing, it follows very conservative accounting practices and writes non-cancellable full-payout leases. By the end of the current fiscal year (September) it expects to have nearly $65 million of equipment on lease. To date, the face amount of leases written each year have approximately equalled the cumulative total of those written since the company was started in 1961. Documentation, Inc. formed the nucleus of a software division, in-

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to which Fox is being merged. The firm's president says that Leasco will use its nationwide marketing organization to bring the newly acquired software "expertise to a broader range of commercial organizations."

Levin-Townsend, should it convert its Realtime securities into common stock, would own approximately 60% of Realtime with Loeb, Rhoades retaining about 25% ownership. The investment in Realtime, said to be a pioneer in time sharing, will allow Levin-Townsend to "participate in the important areas of time sharing and industrial process control," according to Levin. His company has an additional interest in computer programming through two wholly-owned subsidiaries -- Computer Programmers & Analysts, Inc. and Commercial Processing & Automation, Inc. The parent company currently has on lease, primarily in one-year leases, computer equipment with a purchase price of about $20.5 million, virtually all of which was bought from IBM.

Randolph specializes in renting IBM 360 computers to major corporations, and currently has about $44 million worth of this equipment in place. Its recent expansion moves have been into the service bureau business in the Pacific Northwest. United, which was acquired by Randolph for 84,000 shares, is a service bureau in Portland, Oregon. Randolph also runs Electronic Data Services, a service bureau in Eugene, Oregon.

International news

COMMUNIST CHINA BUYS A BRITISH COMPUTER DESPITE U.S. OBJECTIONS

United States control of computer shipments to Communist Bloc countries extends further than its power over export licenses to American manufacturers. Foreign products based on U.S. patents are also subject to jurisdiction by the U.S. Dept of Commerce, which stopped a British computer sale to Red China on these grounds last year. Now, Commerce has tried to control foreign computer shipments even more, and has been told it exceeded its bounds.

British computer manufacturer ICT recently closed a sale to Communist China for two medium-scale 1900 series computers. The 1903 and 1905 are to be used for allocating food and fuel resources, for import-export control, and for other assorted commercial applications. Commerce cried foul and claimed the sale was in violation of NATO strategic embargo agreements. The British Board of Trade, however, says the interpretation of the NATO agreements lies within its discretion and that the intended use of the machines removes them from the embargo.

The ICT 1900 family is a two-year-old series of machines that is entirely British . . . therefore no U.S. license is necessary. Thus, the Board of Trade says that the Commerce opinion is just that -- an opinion. So these machines are expected to be delivered. In the case last year, however, the U.S. stopped sale of an EELM computer to Red China because the machine is based, in part, on RCA patents. As a result, EELM (now English Electric Computers) is presently paying damages to China to cover part of the costs of the data center built to house the computers that weren't delivered.

COMMERCE DEPARTMENT SAYS COMPUTER SHIPMENTS ABROAD HIT ALL-TIME HIGH IN 1966

U.S. companies exported $295.2 million of computers and parts during 1966, the Department of Commerce has just announced. The chief customers for this equipment were Canada, France, the United Kingdom, West Germany, and Japan. This figure for computer exports -- which accounted for 52.8% of all business machine exports, itself hitting a new high of $558.8 million -- was up from $222.8 million in 1965 and $217.9 million in 1964.

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TWO BRITISH FIRMS TAKE THE LEAD IN INSTALLING EUROPEAN TRAFFIC CONTROL SYSTEMS

Although Rome has solved its central city traffic problem by simply banning all motor traffic, a growing number of European cities have turned to the computer as a more Twentieth Century approach to the problem. Since last September, at least five major traffic control plans have been either announced or expanded greatly. Two British firms seem to be getting most of the business:

- Plessey, a comparative newcomer to the computer manufacturing field although it has been working in computer components for over ten years, has sold three of its XL 9 computers for use in two different English traffic control projects.
- Elliott, with its ARCH 9000 process control computer, appears to be getting the majority of business on the Continent.

One of the first ARCH 9000s for computerized traffic control has been operating at the Police Traffic Control Headquarters in Munich, Germany since January, 1966. One of the oldest such systems in Europe, the Munich setup is also considered to be the most advanced. Detectors at strategic spots throughout the city feed information on traffic speed, density, public transport requirements, and other factors to the computer, which then regulates traffic flow and direction to best fit existing conditions. In what is called a "self-optimizing, continuous program development technique," the computer continuously re-writes its own programs in accord with actual traffic conditions rather than selecting the most appropriate sequence from a stored set of programs.

When complete, the system will control 60 traffic zones, each of which contains between five and 75 intersections. Until quite recently, the computer handled only 20 zones. But now, with the recent addition of an Elliott 4120 on-line data processor, for "high level coordination," the system can control traffic in 40 zones.

The success of the Munich scheme has led to two orders from Spain. The cities of Madrid and Barcelona have each ordered an ARCH 9000 system plus software and displays from Elliott. The equipment, expected to be operational within 18 months, will control 117 intersections in Madrid and 108 in Barcelona.

In England, two major traffic control projects are underway with Plessey XL 9s. In Liverpool, where traffic pours into the middle of town from the Mersey Tunnel, a computer has been put to work unraveling the snarl. And Britain's Ministry of Transport has also started a pilot project in West London, where two XL 9s will be used to control a fairly small area of traffic. This experiment was started early this year. If it is successful, Plessey could well become the major supplier for traffic control systems throughout the United Kingdom.

Rather than supply computers for actual traffic situations, one firm has developed a market for theoretical traffic handling methods. To assist with traffic forecasting and simulation, English Electric Computers (formerly English Electric-Leo-Marconi) has developed a software series known as Auto-TRIP (Automatic Transportation Research Investigation Programs). The programs are for the EELM KDF 8 and KDF 9 computers, and are available through the company's service bureaus. The City of Worcester has already used this service. EEC apparently will concentrate on this type of forecasting and on road network planning. In addition, it will continue work with the Transportation Ministry's Road Research Laboratories to test different methods of traffic control. Thus, EEC could have a stake in future traffic control systems.

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STOCK MARKET REPORT ON SELECTED EDP FIRMS

May 1 - May 26, 1967

	1967 High	1967 Low	4 weeks Sales in 100's	4 weeks High	4 weeks Low	Last	4 weeks Net Change	4 weeks % Change
NEW YORK STOCK EXCHANGE								
Addressograph-Multigraph	64	46 7/8	5640	64	53 3/8	58 1/2	+2 3/4	+4.93
American R & D	95 1/2	37 3/4	960	89	80 3/4	82 1/2	-6 1/2	-7.30
Ampex Corp	35	22 3/4	9107	35	29 7/8	33 3/4	+4	+13.44
Burroughs	132 1/4	80 7/8	2956	132 1/4	118 3/4	127	-1 3/8	-1.07
Collins Radio	95 1/2	53	4160	95 1/2	78 1/4	94	+11 7/8	+14.46
Control Data	100 1/4	33 1/2	14502	100 1/4	75 3/8	91 3/4	+10 5/8	+13.10
Electronic Associates	27 1/8	16 3/4	1757	22	19 3/8	19 3/8	-2 1/8	-9.88
General Electric	95	82 1/2	5063	95	86 1/8	88 1/4	-6 5/8	-6.98
Honeywell	88 1/4	63 1/2	2608	77 7/8	69 3/4	71 7/8	-5 5/8	-7.26
IBM	499	362 1/2	1878	485	458	470	-13 1/4	-2.74
Inter Tel & Tel	96 1/4	72 1/2	2212	94 7/8	91 1/2	91 1/2	-1 1/2	-1.61
Litton	110 3/4	79 1/2	3694	110 3/4	98 3/8	99 1/8	-7 7/8	-7.36
Nat Cash Register	102 1/2	67 1/8	2030	102 1/2	92 1/2	96	+1 3/4	+1.86
RCA	55 1/2	42 5/8	6803	54 1/2	50 1/2	50 7/8	-3 3/4	-6.86
Raytheon	78 3/4	49	4063	78 3/4	68	78 1/4	+10 3/4	+15.92
Sanders	91	53 1/4	1461	91	79 3/4	83 3/8	-2 5/8	-3.05
Scientific Data	117 1/4	63 7/8	3069	115	103	106 1/4	-4 3/8	-3.95
SCM	82 1/4	52 5/8	15797	82 1/4	67 3/4	69 1/4	+2	+2.97
Singer	64	45	4447	64	60	60 3/4	+1/2	+0.83
Sperry Rand	36	28 1/2	26055	34 1/8	30 3/4	32	+1/8	+0.40
Teledyne	189 3/4	80 1/8	2865	189 3/8	164	180 1/8	+12	+7.14
NYSE COMPUTER STOCK AVERAGE							+0.36	+0.81
AMERICAN STOCK EXCHANGE								
ANelex	22 1/8	11 1/2	1870	22 1/8	17 1/2	19 1/8	+1 3/8	+7.75
Audio Devices, Inc	30 3/8	21 5/8	639	28 1/4	23 3/4	24 7/8	-2 3/8	-8.72
Bunker-Ramo	12 1/4	7 1/2	3421	12	9 3/4	10 3/8	-1/8	-1.19
Cal Comp	78 1/2	60 1/4	1749	78	65 3/8	71 1/4	-5 1/2	-7.17
Clary	9 1/8	4 1/8	1774	9 1/8	7 1/4	8 1/2	+1 1/4	+17.24
Computer Applications	26 7/8	14	1874	26 7/8	20 7/8	22 3/8	+1/8	+0.56
Computer Science	47 3/4	20 3/4	1545	47 3/4	40 3/8	40 3/4	-3 1/2	-7.91
Digital Equipment	71 3/4	29 3/8	1563	68 3/4	57 1/8	67 3/8	-1/4	-0.37
Leasco Data Proc Equip Corp	78 3/4	33 5/8	1341	76	65 5/8	68	-2 1/2	-3.55
Levin-Townsend Computer Corp	54	10 7/8	2923	54	39 3/4	48 3/4	+7 1/2	+18.18
Milgo Electronics	15 5/8	5 1/8	2768	15 5/8	8 7/8	10 1/8	+1 1/4	+13.69
Planning Research	38 3/4	19 5/8	1040	38 3/4	31 1/4	36 1/4	+5 1/4	+16.93
Potter Instrument	25	12 3/8	2785	25	21 1/2	23 1/2	+2 1/8	+9.94
AMEX COMPUTER STOCK AVERAGE							+0.34	+4.26

	High Bid	Low Bid	May 26 Bid	May 26 Asked	4 weeks ago Bid	4 week net change Bid	4 week % change Bid
OVER-THE-COUNTER							
Applied Data Research, Inc	8 3/4	3 1/8	6	6 1/2	5 3/4	+1/4	+4.35
Aries Corp			19 1/2	19 3/4	16 5/8	+2 7/8	+17.29
Automatic Data Processing	43	23 1/2	36	36 3/4	37	-1	-2.70
Bolt, Beranek & Newman, Inc	20 1/4	8 1/4	20	20 3/4	15 1/4	+4 3/4	+31.15
C-E-I-R	14 1/4	6 5/8	10 3/4	11 1/8	12 5/8	-1 7/8	-14.85
Computer Usage	44 1/2	20 1/2	40	41 1/2	41 1/2	-1 1/2	-3.61
Cyber-tronics	17 1/2	4 3/4	15 1/4	16	14 1/4	+1	+7.02
Data Products	12 7/8	2 1/2	12 1/4	12 1/2	9 1/2	+2 3/4	+28.94
Digitronics	12 3/4	6	11 1/4	11 3/4	12	-3/4	+6.25
Documentation, Inc	10 1/2	3 3/4	9 1/2	10	9 1/2	--	--
DPA, Inc	16 1/4	4 1/4	12 3/4	13	14 1/2	-1 3/4	-12.07
Electronic Memories	28 3/4	12 3/4	28 1/2	29	23 3/4	+4 3/4	+20
Fabri-Tek	11 3/4	6	10 1/4	10 3/4	11 1/4	-1	-8.89
G-C Computer	28	10 1/4	23 3/8	24 1/4	26 3/4	-3 3/8	-12.62
Informatics, Inc	24 1/2	7 1/2	23	24	22 1/2	+1/2	+2.22
Management Assistance	24 3/8	13 5/8	19 7/8	20 3/8	16 7/8	+3	+10.21
Memorex	142	63	131	133	118	+13	+11.02
Mohawk Data Sciences	85 1/2	32	78	79 1/2	73	+5	+6.85
+ Randolph Computer Corp	33	29	29	30	54	+4	+7.41
Recognition Equipment, Inc	131	48 1/2	103	106	119	-16	-13.45
Standard Computers			20 1/2	21 1/4	19 1/4	+1 1/4	+6.49
Systems Engineering Labs			23 3/4	24 1/2	24 1/2	-3/4	-3.06
* Tab and Business Services	11	6 1/2	10 7/8	11 3/8	7 5/8	+3 1/4	+6.49
University Computing Co	79	65	76	78	68	+8	+11.76

+stock split
*new listing on this table

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E|D|P
INDUSTRY AND MARKET REPORT

A SEMI-MONTHLY NEWSLETTER FOR EXECUTIVES IN THE ELECTRONIC DATA PROCESSING INDUSTRY, AND THE FINANCIAL COMMUNITY.

P. J. McGovern, Editor
Telephone 617/332-8840

OPTICAL SCANNING, SLOW TO CATCH ON AS COMPUTER INPUT METHOD, MAY COME INTO WIDER USE AS SMALL AND LARGE FIRMS BRING PRODUCTS TO THE MARKET

The input bottleneck has hindered the execution of data processing applications since its very earliest days, and even today many users of the latest third-generation computer equipment are all too often input bound. Many schemes have been talked about and tried. One of them -- optical scanning -- has been around about as long as the computer, but it still hasn't caught on except in specialized applications. This situation may be about to change, but there are still many uncertainties in the picture.

In 1954, before a single commercial computer was in operation, an optimistic company called Intelligent Machines Research Corp. installed the first commercial optical character recognition (OCR) machine for use by the Readers Digest Company, converting written documents into punched cards for the magazine's subscription department. But progress in this field has been slow: The purchaser of Intelligent Machines, Farrington Manufacturing Co., expects to operate at a profit for the entire of 1967, for the first time in the firm's 10-year efforts in optical scanning.

This can be explained, in part, by looking at the two very different situations that have developed during the 13 years since computers and optical scanners went into commercial use: Over 33,000 computers have been installed in this country, and input -- which often can be speeded with optical scanning -- is still a problem. Yet only about 800 optical scanning systems have been installed, although almost every computer is a potential user of one or more optical scanning devices. All but a few dedicated companies, in fact, treat optical scanning as a mere sideline, a potential but not presently profitable product.

Indeed, Recognition Equipment, Inc., another of the few companies that specialize in OCR equipment, says: "The OCR industry is still in its infancy stage; i.e., similar to the computer industry around 1957 or 1958. Manufacturers now, as computer manufacturers then, are clumsy in knowing how to sell their systems. And users are clumsy in knowing how to evaluate potential equipment." Somehow, the computer industry took off running after initial demonstrations; the optical scanning "industry" didn't.

The parallel drawn here is not quite fair. The optical scanner of 1954 was probably more comparable to the computer of, say, 1948. And nothing has come along for optical equipment that improves efficiency and reduces cost the way the trans-

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istor led to a new generation of computers in the late 1950s. Also, there are other reasons why the growth of optical scanning has been stunted:

- Computer manufacturers, especially IBM, with thousands of keypunch and verifying machines already on lease, have been somewhat reluctant to develop and merchandise machines that will replace an already depreciated source of rental revenue. Thus, the most ardent supporters of optical scanning are the few small companies, with equally small budgets for promotion and education, that concentrate primarily on readers.

- Computer users, accustomed to cards as the initial input for operations, are often resistant to change and thus stay with keypunching.

- Users, also, have heard little about optical scanning in recent years (although a few years ago there was enthusiasm about computers with "eyes"). The current input possibilities being given lots of attention are on-line keyboards linked to time-sharing systems. Thus, many users (such as banks, for example) are planning to wait and see how computer systems are going to look a few years from now.

- The initial unit cost of optical scanning equipment, often starting at several thousand dollars a month, can make a shift to this type of input too expensive for the small computer user, even though he might save money in the long run.

- There are several techniques of scanning, many types of scanning equipment with many levels of sophistication and reliability. Some machines recognize characters or read lines, some interpret codes, some strictly sense the presence of a mark. Thus, for most potential users, it often is easier to ignore scanning than to get involved in feasibility studies, equipment selection, and the like.

The chart below shows the major manufacturers of various optical scanning equipment and the types of equipment they market or plan to make. Within each category of machines, it should be remembered, there are products with widely varied capabilities and costs.

OPTICAL SCANNING MANUFACTURERS AND PRODUCTS

	Bar Code Reader	Mark Sense Reader	Journal Tape Reader	Styled Font Line Reader	Styled Font Page Reader	Multi-Font Reader	Hand-Printed Character Reader
A-M	X						
Control Data					X		
Farrington		X	X	X	X		?
Honeywell	X	X					
IBM		X	X	X	X	?	F
NCR			X				
Optical Scan.		X					F
Philco				X	X	?	?
RCA		X		X			
Recog. Equip.	X					X	?
Univac		X					

X = offered commercially; F = announced; ? = may be marketed

Despite this proliferation of optical scanning products, and despite the apparent reluctance of many customers to shift away from punched cards, there are signs, lately, that optical computer input may be coming into its own. The three companies that concentrate on optical scanning -- REI, Farrington, and Optical Scanning -- have definite prospects for profit . . . after years of loss. And even IBM -- the company that initially stands to lose most by shifting computer users from punched cards to optical input -- is stepping up its pace. Most of its emphasis, however, seems to be in applications that are new to the computer or where punched cards are not feasible as computer input, such as journal tape analysis. But IBM's efforts, naturally, will help all of optical scanning.

A new breed of machines

IBM's first major move, in fact, came last fall when it announced its model 1287 optical reader at the BEMA show in Chicago. The machine, working with a 360 model 30 or larger computer, reads many different type faces as well as all hand-printed numbers plus five letters. IBM says that its machine "has generated great interest on the part of a wide variety of computer users." Deliveries are scheduled to start in the first quarter of 1968, and several hundred reportedly are on order.

Already, possible competition for the 1287 has emerged, and if the machine is successful, several other manufacturers will probably market something similar:

- In February of this year, Optical Scanning Corp. announced its OpScan 288, for delivery during the last quarter of 1967, that has features -- including the recognition of hand-written numbers and a few letters -- similar to the IBM entry. The 288 will sell for $98,000; IBM's Model I 1287 lists at $162,000. The 1287 operates on-line, the 288 converts information to magnetic tape.

- REI has announced that its Electronic Retina Computing Reader can be modified to read hand-printed characters but the company isn't enthusiastic. "We've had all sorts of interest from bingo card circlers . . . but not much serious interest. We feel that for most applications it's not the best way to go, for two reasons: (1) you have a hell of a time making people be careful enough, and (2) if they are careful, they work too slowly."

- Farrington's president, Norville White, tells EDP I&MR that a "hand-written digit reader, which we have developed and demonstrated, may become our fifth model when the market for this equipment is more fully proven." (Emphasis ours.)

IBM says its 1287 reader makes it easier than ever before for people -- clerks, warehouse personnel, truck drivers, field repairmen, production-line workers, nearly everybody in a business organization -- to communicate directly with a computer. But the stress seems to be on retailing, with the scanner reading characters printed by cash registers, adding machines, and credit card imprinters.

Optical Scanning, on the other hand, believes its machine is especially suitable for high volume operations involving "turnaround documents" such as bills, premiums, information requests, and subscription notices. (Turnaround documents are prepared at high speed by a computer and sent out to customers. Later, when they are returned, new information such as the amount paid or a changed address is added to them and they are fed back into the computer.)

The simplest approach

Part of the confusion about optical scanning comes from the wide range of technical capabilities found in various products. Probably the simplest, in principal, is the mark sense reader, which does exactly as its name implies -- detects the presence of a mark on an input document. The prime use of this device is for converting hand-marked Hollerith cards, or test score sheets, into a machine-readable form . . . punched cards, punched tape, or magnetic tape. Often, this capability is included with another type reader so that a variable can be added to a pre-printed form.

Optical Scanning Corp. is probably the leading supplier of these type systems. Almost 100 of its Digitek 100 optical readers are installed, primarily for test scoring applications. IBM also makes a competitive machine for educational test scoring, and Univac has recently announced an optional mark reader with its 9000 series of computers. Several other manufacturers, also, have variations or adaptations of a mark reader, which is easily incorporated into any other type optical scanner.

There is another significant difference between the two machines. With the OpScan 288, hand-written characters must be printed in a grid that resembles a row of dominos with four dots in each square. This insures that the characters conform to the machine's recognition patterns. The 1287 recognizes characters by following curves with a "flying spot" of light from a cathode ray tube. Thus, it allows wider variation in the quality of hand printing that will be read.

NCR may feel pressure from IBM's new product most directly, although it is not planning to counter with a similar machine. "NCR is not, and does not anticipate being engaged in any program to develop optical readers for recognition of hand-written business documents. The company's efforts have historically been devoted toward business systems utilizing machine-printed records to achieve improved control of transactions, reduction of manual paper work, and easily traceable and accurate accounting entries."

It does use OCR technology heavily, however, and has based its products on its line of original entry business machines which create, "as an automatic by-product of a necessary accounting function," a printed tape that can serve as direct input into a computer without the need of conversion to an intermediate language. The company reports that it has already installed more than 20,000 business machines that have optical-print fonts.

One of its optical readers, an NCR 420-2 that sells for $80,000, will form the heart of a recently announced management information system devised by NCR for the Frigidaire Div. of General Motors. Journal tapes produced by Frigidaire retailers will be periodically sent to any of 23 NCR data centers scattered across the U.S.

Not everyone thinks the journal tape approach is best. Honeywell, for example, thinks that on-line data collection systems promise to be the ultimate solution to the problems of the decentralized company. It has recently announced a Unitote system that requires cash registers operating on-line with regional centers which convert sales information directly into computer-readable tape. And Honeywell thinks this approach will even be followed by NCR which, on the cover of its 1966 Annual Report, featured a mock-up of an on-line NCR cash register. According to Honeywell, "the collection of journal tapes becomes impractical in companies where many registers are located at many branch stores."

A slightly more sophisticated product is the bar code reader. This device reads coded information -- in the form of vertical bars -- and transforms it into the pro-

per input for a computer or communications system. The code usually takes up more room than its equivalent in alphanumeric symbols, but the equipment usually reads more reliably and costs less than that for true character readers. One use, pushed by Addressograph-Multigraph, has been with plastic credit cards.

And Honeywell, which like A-M has limited its optical product line to bar code readers, has put this type device to work in two interesting applications. One is in connection with the coupon issued by a premium company. The other was worked out with Metropolitan Life Insurance Co. Its insurance notices and other turnaround documents are pre-coded with bar code by the computer as they are issued. When these documents are returned, they are fed into a communications console that transfers information to paper tape, then transmits it to the central computer on command. Some 900 of these consoles will connect Metropolitan offices when this system is complete next year.

Reading "funny" letters

To most people, optical scanning means reading written documents . . . optical character recognition. Most major computer companies, as well as the independents, concentrate in this field. Credit card accounting has been a major application for OCR, and Farrington entered this field quite early by supplying equipment to the major oil companies. It now manufacturers entire systems including embossing equipment, imprinters, credit cards, and optical character readers. It sees future business with banks, as their credit card programs have increased from less than 100 at the beginning of 1966 to more than 1000 at present, the company says.

Some OCR machines read lines of type, some whole pages, and most are limited to a few specialized or stylized fonts of type. Farrington, with a page reader that recognizes four standard type fonts that are easily read by people, gives an example to justify optical reading over card punching. In eight hours, the company says, one of its page readers will process the eight-hour output of 100 typists at electric typewriters. These typists, their typewriters, and a Farrington 3030 Page Reader would cost $39,500 a month, the company says.

By contrast, the example continues, it would take 210 keypunch operators to produce the same output as 100 typists. Salaries and keypunch rental for this would amount to $96,600, says Farrington, or $57,100 a month more than its OCR system. In addition, it claims, the optical system would probably give greater accuracy. These figures are supplied by the optical reader manufacturer, of course, but they certainly are vivid enough to make the large volume computer user pause and think.

Government help

As in most technologies today, the more sophisticated work is being done under government contract. One of these projects, being done for the Social Security Administration by IBM, has led to a machine that could soon be the basis for an important addition to IBM's OCR line, already the largest in the industry.

Not yet commercially available, the IBM 1975 can read more than 200 different type faces at speeds of more than 650 lines per minute. At a Baltimore facility, the machine, under control of a 360/30, reads the names, Social Security numbers, and quarterly earnings of about half the 70 million wage-earners in the U.S. and transfers this data to magnetic tape.

Results reported by the Social Security Administration give more food for thought about the economics of optical scanning. The 1975, according to adminis-

tration estimates, will save it some $750,000 a year (approximately the purchase price of the machine). It has replaced about 120 to 140 keypunch operators but none have been dismissed. Rather, they have been reassigned within the Administration.

Another company which has benefitted from government-supported research is Philco. Since 1963 it has worked closely with the Post Office Department in the design of equipment for reading and sorting machine-printed ZIP codes on envelopes. Philco's machine can separate mail into as many as 279 different destinations at the rate of 36,000 an hour.

This hasn't been the easiest program in the world for Philco, according to reports. As one observer put it, "It looks like Philco has survived the ZIP-code project." Now, things seem to be better. One system is installed in Detroit, another is on order for Buffalo, and the Post Office has placed an order for eight more.

NCR has also been doing ZIP-code work, but has not had Philco's success. In 1963 it was awarded a $500,000 contract to develop a reader, which it constructed and delivered in 1966. Although it has completed a nine-month test in the Postal Laboratory, no orders have come from the contract. But the company still has a chance to obtain major funding from the Post Office for work in a different area. In 1966, NCR received $112,000 to study the reading of ZIP codes on packages, and this year received an additional $244,000 to develop a device that rotates packages so that all addresses face the same way.

Dwarfs among giants

Two of the three companies devoted exclusively to the optical scanning market have recently reported profitable financial periods following "trying times." The third sees an improving financial picture, with profitability arriving late in 1968.

Farrington Manufacturing Corp., the oldest surviving company in the OCR industry, lost $415,000 on $17.4 million revenues during 1966, continuing a trend started in 1957 when it entered the OCR business. Limited working capital during the first quarter of 1966 severely curtailed production of optical readers and the company lost almost $539,000 on a revenue of $2.8 million. This January, however, it negotiated a loan that permitted reestablishment of full production, and deliveries during the first quarter of this year reached levels "not previously expected until 1969-1970." During this period, the company showed a profit of $122,000 on revenues of $4.7 million, and Farrington President Norville White predicts that his company will operate at a profit during this entire year.

Optical Scanning Corp. has broken into the profit column, also, with income of $114,000 on revenue of $1.8 million for the nine months ended March 31. During the same period of the preceding year, losses of over $141,000 on revenues of slightly over $642,000 were reported. The company makes no prediction for the entire fiscal year, but its seven-year string of losses seems to be broken. It should be noted, however, that a major reason for the profitable report is an agreement between Optical Scanning and Optical Scanning Leasing Inc., a wholly owned subsidiary of Chandler Leasing Corp. Seventeen of 21 Digitek mark readers sold during the nine-month period went to OSL, and without these sales Optical Scanning would not have shown a profit. Indeed, its present backlog of 17 systems is small compared to the 39 it sold or leased during the nine months ended March 31. As its machines get into the field, of course, Optical Scanning does have a growing source of income from the sale of input documents, which accounted for 21% of the company's revenues during the last nine-month period. It has sold some 54 million documents and at present has a 4 million backlog, which will require two months to print.

Owned 40% by American Research and Development, Optical Scanning went public last year with a 200,000-share offering which brought in some $3.5 million. At present, the company is applying to the SEC to sell an additional 100,000 shares, from which it hopes to raise some $6 million. This money will be used to support leased machines as well as to develop and market several new products, which as yet have attracted little user interest. There is only one letter of intent for the OpScan 288; only one SelectAddress system, for finding changes of address on cancelled dividend checks, has been sold . . . to Chemical Bank New York Trust Co.; one order has been placed for a TicketScanner that will scan price tag stubs for a mail-order house; a communications console, called Telescan, is priced at $57,500 but none have been sold.

Recognition Equipment, Inc., the only company which markets a multi-font reader, not only is still running in the red but also shows losses larger than gross income. During the six months ended April 30, the company reported a loss of $1.75 million on gross income of $1.3 million. This compares to a loss of just over $1 million on gross of $356,000 during a similar period in 1966. Indeed, Herman L. Philipson, Jr., its president, foresees the company's first profitable month arriving near the end of fiscal 1968. The company has two sources of funding to carry it through the next few years: Last year it offered $9.6 million in convertible subordinated debentures due in 1981 and secured a loan commitment from four banks for $8 million.

In order to attain profitability by or before the end of fiscal 1968, REI will have to:

1. Maintain a one-to-four purchase-to-lease ratio, perhaps by giving price concessions to equipment purchasers.
2. Convince its users to patronize its new subsidiary, Corporation S, which will supply programming and systems support on a fee basis. If this is successful, heavy support costs for newly leased systems may be eliminated.
3. Repeat its success in the airline industry (where almost every domestic line uses a Retina system) in some other industries. Interest shown by the Chicago Board of Education, Perry Publications, Wachovia Bank and Trust, and Texaco has not been shared, as yet, by organizations with similar application problems.
4. Be prepared to compete with giant IBM, whose 1975 multi-font reader, developed for the Social Security Administration, could offer serious competition to the Electronic Retina Computing Reader.

Conclusion

The optical scanning industry, if it is getting off its feet and becoming important to the computer user, is doing so primarily because the large companies such as IBM have finally decided it was profitable. EDP I&MR can't help but admire some of the smaller companies for sticking to their guns; at the same time, we can't understand the financial community's evaluation of these companies. Optical Scanning and REI, for example, are not even showing a profit yet are valued, respectively, at 14 and 86 times gross annual revenue. This is hard to justify.

The future of optical scanning is still somewhat uncertain, although the recent activities of IBM and other companies imply that products will start to move. It must be remembered, however, that if OCR technology does make a critical breakthrough, it would be -- in all likelihood -- the computer systems manufacturers, with their millions of dollars in resources, that would exploit such a development and that would reap the largest rewards.

STOCK MARKET REPORT ON SELECTED EDP FIRMS

May 29 - June 9, 1967

NEW YORK STOCK EXCHANGE	1967 High	1967 Low	2 weeks Sales in 100's	2 weeks High	2 weeks Low	Last	2 weeks Net Change	2 weeks % Change
Addressograph-Multigraph	64	46 7/8	1203	63	57 1/2	59 1/2	+1	+0.85
American R & D	95 1/2	37 3/4	670	86 1/2	71 1/4	86 1/2	+4	+4.85
Ampex Corp	35	22 3/4	2638	33 7/8	29 1/2	33 3/8	-3/8	-1.11
Burroughs	132 1/4	80 7/8	1986	130 1/2	117 1/2	128 3/4	+1 3/4	+1.38
Collins Radio	100 1/2	53	4882	100 1/2	86 1/2	99	+5	+5.32
Control Data	104 5/8	33 1/2	9206	104 5/8	86 1/8	103 3/4	+12	+13.08
Electronic Associates	27 1/8	16 3/4	522	19 1/2	16 7/8	19 1/2	+1/8	+0.65
General Electric	95	82 1/2	2280	88	83 3/4	85 5/8	-2 5/8	-2.97
Honeywell	88 1/4	63 1/2	929	72 7/8	68 1/4	71 1/2	-3/8	-0.52
IBM	499	362 1/2	835	486	463 1/2	486	+16	+3.40
Inter Tel & Tel	96 1/4	72 1/2	1804	95	86 1/4	95	+3 1/2	+3.82
Litton	110 3/4	79 1/2	2283	105	93 7/8	103	+3 7/8	+3.91
Nat Cash Register	102 1/2	67 1/8	804	96	89 1/4	94 3/4	-1 1/4	-1.30
RCA	55 1/2	42 5/8	3933	51 3/4	47	50 7/8	- -	- -
Raytheon	83 3/8	49	2049	83 3/8	73 1/4	83	+4 3/4	+6.07
Sanders	91	53 1/4	716	90 5/8	79	90 5/8	+7 1/4	+8.70
Scientific Data	117 1/4	63 7/8	1941	113 3/4	96 1/8	111 1/4	+5	+4.70
SCM	82 1/4	52 5/8	2378	69 3/8	61 1/2	67 1/4	+2	+2.89
Singer	64	45	1617	61 5/8	57 3/8	61 5/8	+7/8	+1.44
Sperry Rand	36	28 1/8	7011	33 1/8	30 1/8	33 1/8	+1 1/8	+3.52
Teledyne	189 1/2	80 1/8	1799	189 1/2	165 1/8	189 1/8	+9	+5.00
NYSE COMPUTER STOCK AVERAGE							+3.46	+3.03
AMERICAN STOCK EXCHANGE								
ANelex	22 1/8	11 1/2	524	20 3/8	15 3/4	20 3/8	+1 1/4	+6.54
Audio Devices, Inc	30 3/8	21 5/8	250	24 5/8	22 1/4	23 5/8	-1 1/4	-5.02
Bunker-Ramo	12 1/4	7 1/2	2682	11 1/2	10	11 1/2	+1 1/8	+10.84
Cal Comp	79	60 1/4	767	79	62 3/4	79	+7 3/4	+10.88
Clary	9 1/8	4 1/8	465	8 3/4	7 1/8	8 3/8	-1/8	-1.47
Computer Applications	26 7/8	14	546	22 3/8	18 3/8	21 3/4	-5/8	-2.79
Computer Sciences	47 3/4	20 3/4	1023	41 1/4	35 1/4	38 1/2	-2 1/4	-5.52
Digital Equip Corp	71 3/4	29 3/8	648	70 5/8	59 1/8	70 1/4	+2 7/8	+4.27
Leasco Data Proc Equip Corp	78 3/4	33 5/8	684	67 3/4	59	67 1/8	-7/8	-1.29
Levin-Townsend Computer Corp	54	10 7/8	1146	49	39 3/8	47 3/8	-1 3/8	-2.82
Milgo Electronics	15 5/8	5 1/8	574	13 3/8	9 1/2	13	+2 7/8	+28.39
Planning Research	38 3/4	19 5/8	149	36 1/2	32 5/8	34 7/8	-1 3/8	-3.79
Potter Instrument	25 5/8	12 3/8	982	25 5/8	18	24 5/8	+1 1/8	+4.79
AMEX COMPUTER STOCK AVERAGE							+0.70	+3.31

OVER-THE-COUNTER	High Bid	Low Bid	June 9 Bid	June 9 Asked	2 weeks ago Bid	2 week net change Bid	2 week % change Bid
Applied Data Research, Inc	8 3/4	3 1/8	7 1/4	7 3/4	6	+1 1/4	+20.83
Aries Corp			17 1/8	17 5/8	19 1/2	-2 3/8	-12.18
Automatic Data Processing	43	23 1/2	37 3/4	38 1/2	36	+1 3/4	+4.86
Bolt, Beranek & Newman, Inc	20 1/4	8 1/4	18 1/4	18 3/4	20	-1 3/4	-8.75
C-E-I-R	14 1/4	6 5/8	13 1/8	13 1/2	10 3/4	+2 3/8	+22.09
Computer Usage	44 1/2	20 1/2	37	38 1/2	40	-3	-7.50
Cyber-tronics	17 1/2	4 3/4	14	15	15 1/4	-1 1/4	-8.20
Data Products	14	2 1/2	14	14 1/2	12 1/4	+1 3/4	+14.28
Digitronics	12 3/4	6	12 1/2	13	11 1/4	+1 1/4	+11.11
Documentation, Inc	10 1/2	3 3/4	9 1/4	9 3/4	9 1/2	-1/4	-2.63
DPA, Inc	16 1/4	4 1/4	9 5/8	10 1/8	12 3/4	-3 1/8	-24.51
Electronic Memories	29	12 3/4	29	29 3/4	28 1/2	+1/2	+1.75
Fabri-Tek	11 3/4	6	11 3/8	11 3/4	10 1/4	+1 1/8	+10.98
G-C Computer	28	10 1/4	26 1/2	27 1/4	23 3/8	+3 1/8	+13.37
Informatics, Inc	24 1/2	7 1/2	22	23	23	-1	-4.35
Management Assistance	24 3/8	13 5/8	19 3/4	20 1/4	19 7/8	-1/8	-.63
Memorex	143 1/2	63	143 1/2	146 1/2	131	+12 1/2	+15.43
Mohawk Data Sciences	85 1/2	32	76	77 1/2	78	-2	-2.56
*Optical Scanning Corp	92 1/2	25 3/4	67 1/2	69	67	+1/2	+0.75
Randolph Computer Corp	33	27	30 1/2	31 1/4	29	+1 1/2	+5.17
Recognition Equipment, Inc	131	48 1/2	117	121	103	+14	+13.59
Standard Computers			19	20	20 1/2	-1 1/2	-7.32
Systems Engineering Labs			24 1/2	24 3/4	23 3/4	+1/2	+2.10
Tab and Business Services	11	6 1/2	10 1/4	10 3/4	10 7/8	-5/8	-5.75
University Computing Co			82	84	76	+6	+7.89

*new listing on this table

MAY 1967

E|D|P
INDUSTRY AND
MARKET REPORT

COMPUTER INDUSTRY FACT SHEET

Prepared by the editors of *EDP Industry & Market Report*

American computer manufacturers shipped $3.66 billion worth of computers during 1966. This was more than a 50% increase over 1965 and brought the world population of American computers to 40,600, with almost 30,000 of them in the United States. During 1955, in contrast, $75 million worth of computers were shipped, bringing the U.S. population to 244 machines. Six others were operating in other parts of the world.

The breakdown of new production computer equipment shipped during 1966 was:

Manufacturers	*Sales Value of New Systems*	*% of Total*
IBM	$2,500	68.3%
Honeywell	270	7.4
Control Data	200	5.5
Univac	195	5.3
General Electric	190	5.2
NCR	95	2.6
RCA	95	2.6
Burroughs	60	1.6
Scientific Data Systems	30	0.8
Others	25	0.7
	$3,660	100.0%

The largest computer user is the Federal Government, with about 2600 computers worth over $1.5 billion. Within the Government, the Air Force is the largest computer user.

The largest commercial computer user is AT&T, with about 500 computers worth $225 million.

The five largest computer users among manufacturers are, ranked by value of computers installed on July 1, 1966:

General Motors	$174.61	million
General Electric	95.05	"
Boeing	80.16	"
Lockheed Aircraft	74.76	"
Ford Motor	72.29	"

The top 100 computer users among the world's industrial firms use just over $2 billion, or nearly 16%, of the world's $13 billion of computers now in use.

EDP I&MR predicts that by 1970, American-based computer manufacturers will have installed 54,000 to 58,000 computers in the U.S., and another 35,000 to 38,000 in the rest of the world. By the year 1975, *EDP I&MR* expects the U.S.-based companies will have produced and installed between 150,000 and 170,000 computer systems, with about half in use in the United States.

The total U.S. computer industry, as defined by *EDP I&MR,* includes general purpose computers, special purpose computers, peripheral equipment, software, service bureaus, consultants, supplies, and supporting services. It was at about the $6.6 billion level at the end of 1966. By 1970, it should reach the $9 billion to $10 billion level, and by 1975 this should be a $15 billion to $17 billion industry.

(The information above, prepared for the use of editors, is based on recent issues of *EDP Industry & Market Report*. It has been prepared from the best data available to International Data Corporation, the newsletter's publisher, but its accuracy cannot be guaranteed.)

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